

# FARFISA PORTABLE ORGANS

## SERVICE MANUAL



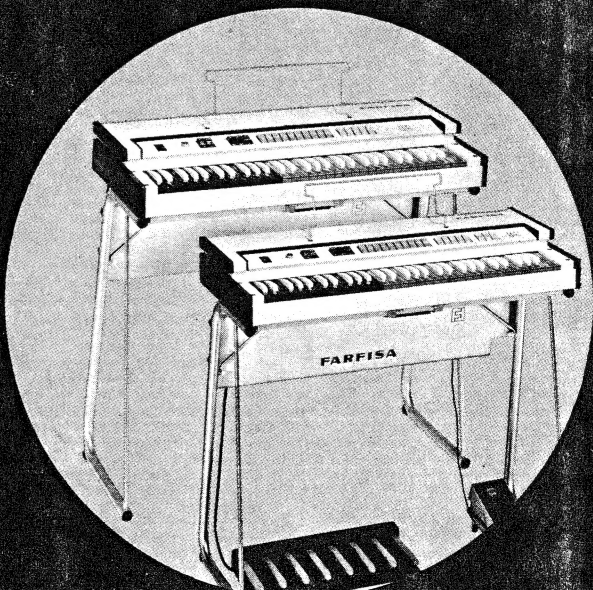
**PROFESSIONAL**



**FAST 2**



**FAST 3**



**FAST 4 & 5**

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## FAST 2

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### SPECIFICATIONS

#### MAIN FEATURES

Keyboard 48 Notes—F to E.  
Manual Bass 12 Notes—F to E.  
4 Voice Stops (violet tabs):  
Clarinet—Flute—Reed—Strings.  
Vibrato Stops (blue tabs):  
Vibrato On/Off—Slow/Fast.  
Overall Volume Control.  
Manual Bass Volume Control.  
Built-in 10 Watt solid-state amplifier.  
Outlet for external additional amplifier.

2 Elliptical Loudspeakers.  
Mains Switch and Pilot-light.  
Mains Voltage: 117 V  
Dimensions: 31" x 14½" x 35½"  
Weight: 44 lbs.  
4 Removable Legs and Retractable  
carrying handle.  
Metal cabinet covered with washable  
plastic.  
Swell Pedal (optional).

## **ADJUSTMENTS FAST 2**

### **VR1 VIBRATO SPEED**

Vibrato speed may be adjusted using a small regular screwdriver. Proper speed is between 6-7 Hertz with the Vibrato speed tabswitch set in the Fast position.

### **VR4 ORGAN VOLUME**

Set to customer preference! Take into consideration that a full setting may overdrive the speakers causing distortion.

### **VR5 BIAS**

This adjustment is carefully set at the factory. Adjustment should not be necessary unless amplifier transistors or their associated components are replaced. To set this adjustment: First, turn on the Flute tabswitch and hold a three note chord. Then position the Bias adjustment at the point of minimum distortion. Try other chords on the keyboard, both high and low, to make sure the adjustment is satisfactory over the entire keyboard range.

### **L1 TUNING**

The 12 Tone Generator Master Oscillator circuits determine the pitch of the entire organ. Adjusting any one of the Master Oscillator tuning adjustments will tune all the notes of that tone generator. Tuning any group of 12 notes automatically tunes the entire organ.

Tuning may be accomplished by using a small non-conductive screwdriver and one of the following methods:

1. Set of 12 Tuning Forks: Zero beat the note of the organ to be tuned to the sound of the corresponding tuning fork. This is a highly accurate tuning method.
2. Strobo Conn or Strobo Tuner: This is done by visual observation of a strob pattern. Simply follow directions supplied with the Strobotuner. This is a highly accurate tuning method.
3. Another instrument: Zero beat the note of the organ to be tuned to the sound of a corresponding note on an "in tune" instrument (piano, organ, accordion, etc.) Accuracy is dependent upon the tuning of the other instruments. This method is especially desirable when the other instrument is to be played with the organ.
4. One Tuning Fork: One tuning fork is used to set the "temperament" (one note). The other 11 notes are set by ear using the number of beats between "4ths" and "5ths." This requires a trained ear. Accuracy is dependent upon the tuner.

## FAST 2

### TRANSISTOR VOLTAGES

Q No.	Circuit	Collector	Emitter	Base
Q1	Vibrato Oscillator	+5.5*	+2.8	+2.8
Q2	Vibrato Emitter Follower	+12	+5*	+7*
Q3	Master Oscillator	+2.7	+12	+13
Q4	1st Divider	+6	+1.2	+1.4
Q5	1st Divider	+6	+1.2	+1.4
Q6	2nd Divider	+6	+1.2	+1.4
Q7	2nd Divider	+6	+1.2	+1.4
Q8	Treble Solo Divider	+1.5 or +10	+1.1	+1 or +1.8
Q9	Treble Solo Divider	+1.5 or +10	+1.1	+1 or +1.8
Q10	1st Bass Divider	+1.5 or +10	+1.1	+1 or +1.8
Q11	1st Bass Divider	+1.5 or +10	+1.1	+1 or +1.8
Q12	2nd Bass Divider	+1.5 or +10	+1.1	+1 or +1.8
Q13	2nd Bass Divider	+1.5 or +10	+1.1	+1 or +1.8
Q14	Preamp #1	+2.5	+1	+2
Q15	Preamp #2	+4.5	+7	+4
Q16	Input Preamp	+7	+14	+13
Q17	Bias Transistor	+16	+14	+14.5
Q18	Voltage Amp	+14	$\phi$	+7
Q19	Driver #1	+32	+15	+16
Q20	Driver #2	+6	+15	+14.5
Q21	Output	+32	+15	+15.5
Q22	Output	+15	$\phi$	+6

\*Pulse Voltage

### IMPORTANT

The above voltage readings were measured to ground with a Simpson Model 260 V. O. M. Voltage readings shown are intended only as a guide in troubleshooting. Voltage will vary from organ to organ due to normal manufacturing tolerances.

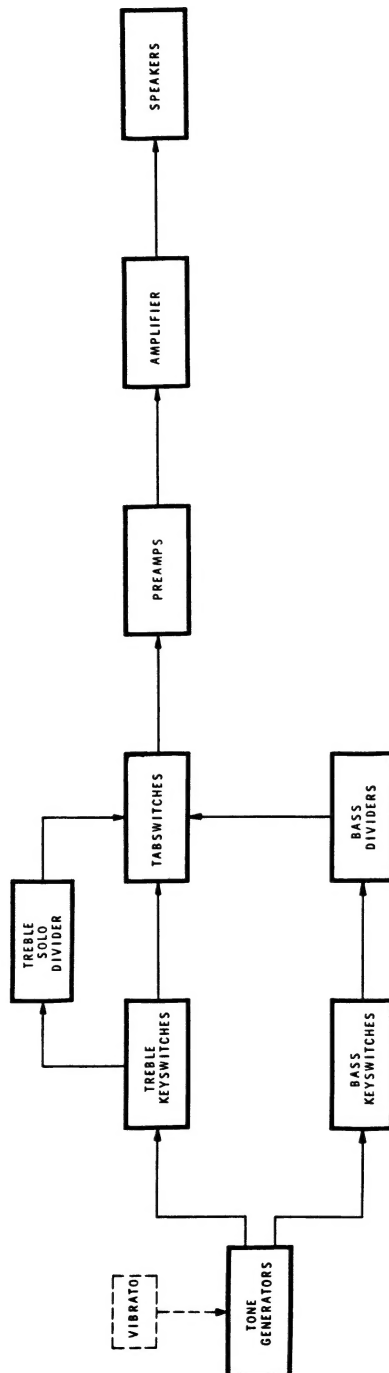
### CAUTION

Exercise extreme care when making voltage measurements. Accidental shorting of transistor leads may damage the transistor.



# BLOCK DIAGRAM

F.A.S.T. 2

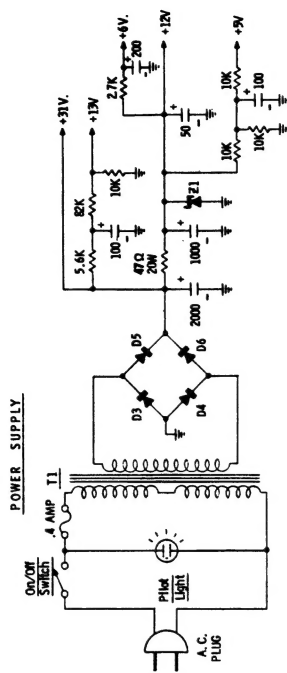
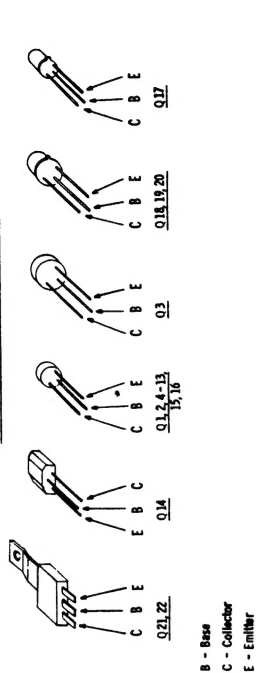


## LEGEND

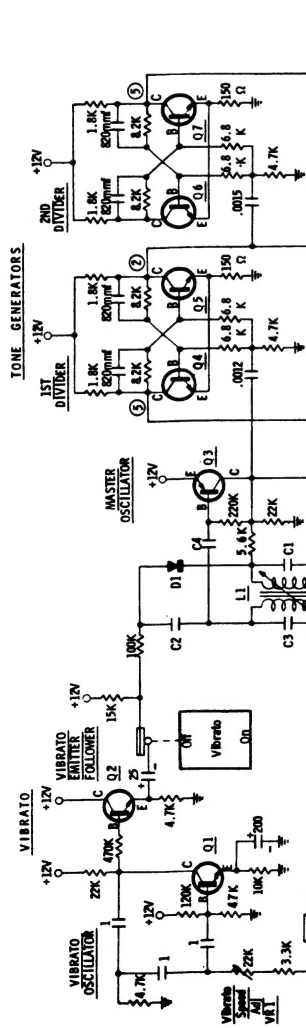
SIGNAL FLOW →

CONTROL

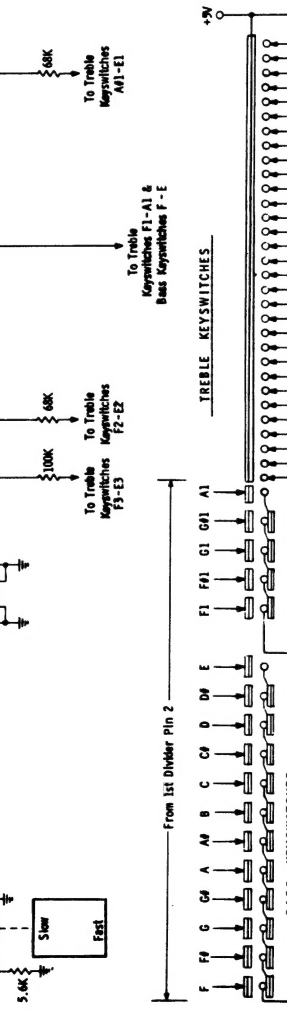
## TRANSISTOR CONFIGURATIONS



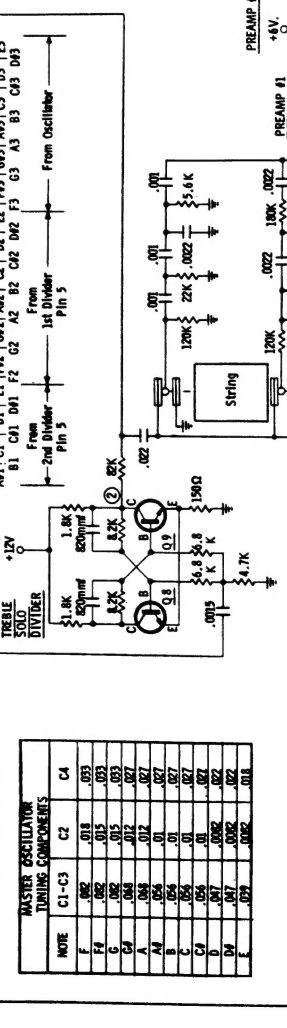
## 1ST DIVIDER



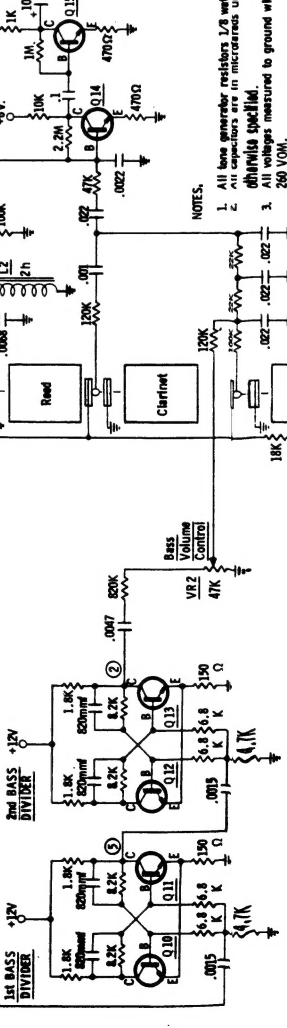
## 2ND DIVIDER



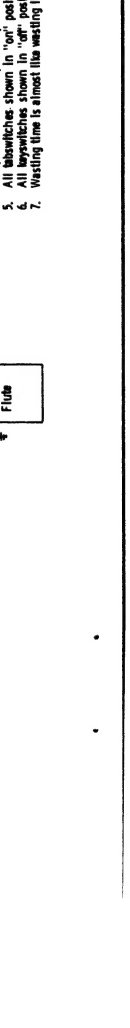
## 3RD DIVIDER



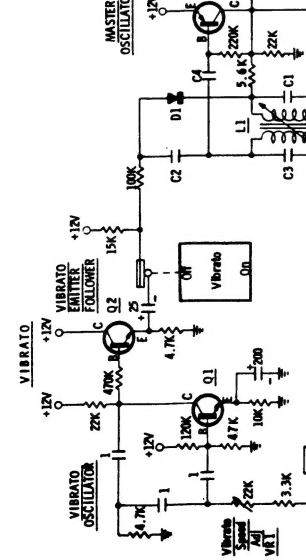
## 4TH DIVIDER



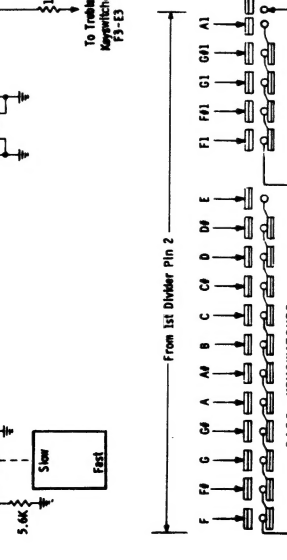
## 5TH DIVIDER



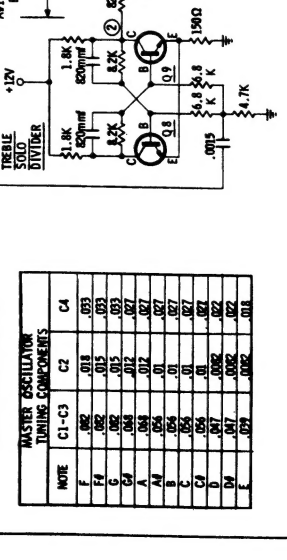
## 6TH DIVIDER



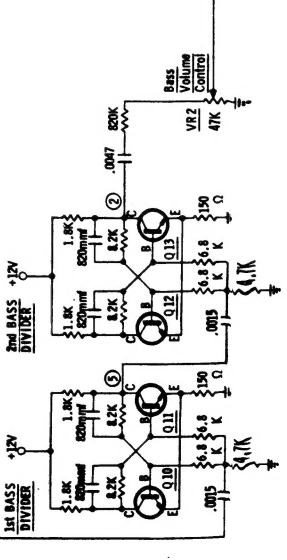
## 7TH DIVIDER



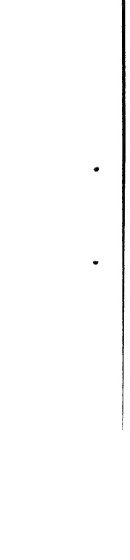
## 8TH DIVIDER



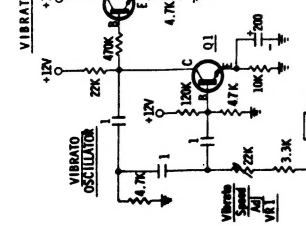
## 9TH DIVIDER



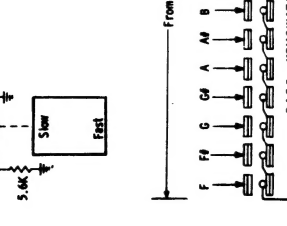
## 10TH DIVIDER



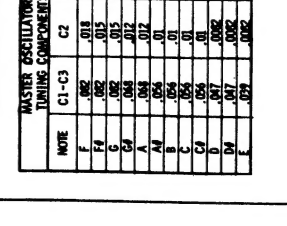
## 11TH DIVIDER



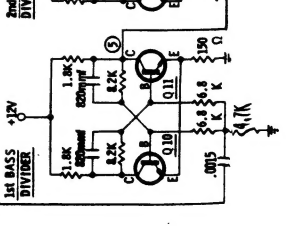
## 12TH DIVIDER



## 13TH DIVIDER



## 14TH DIVIDER



## 15TH DIVIDER

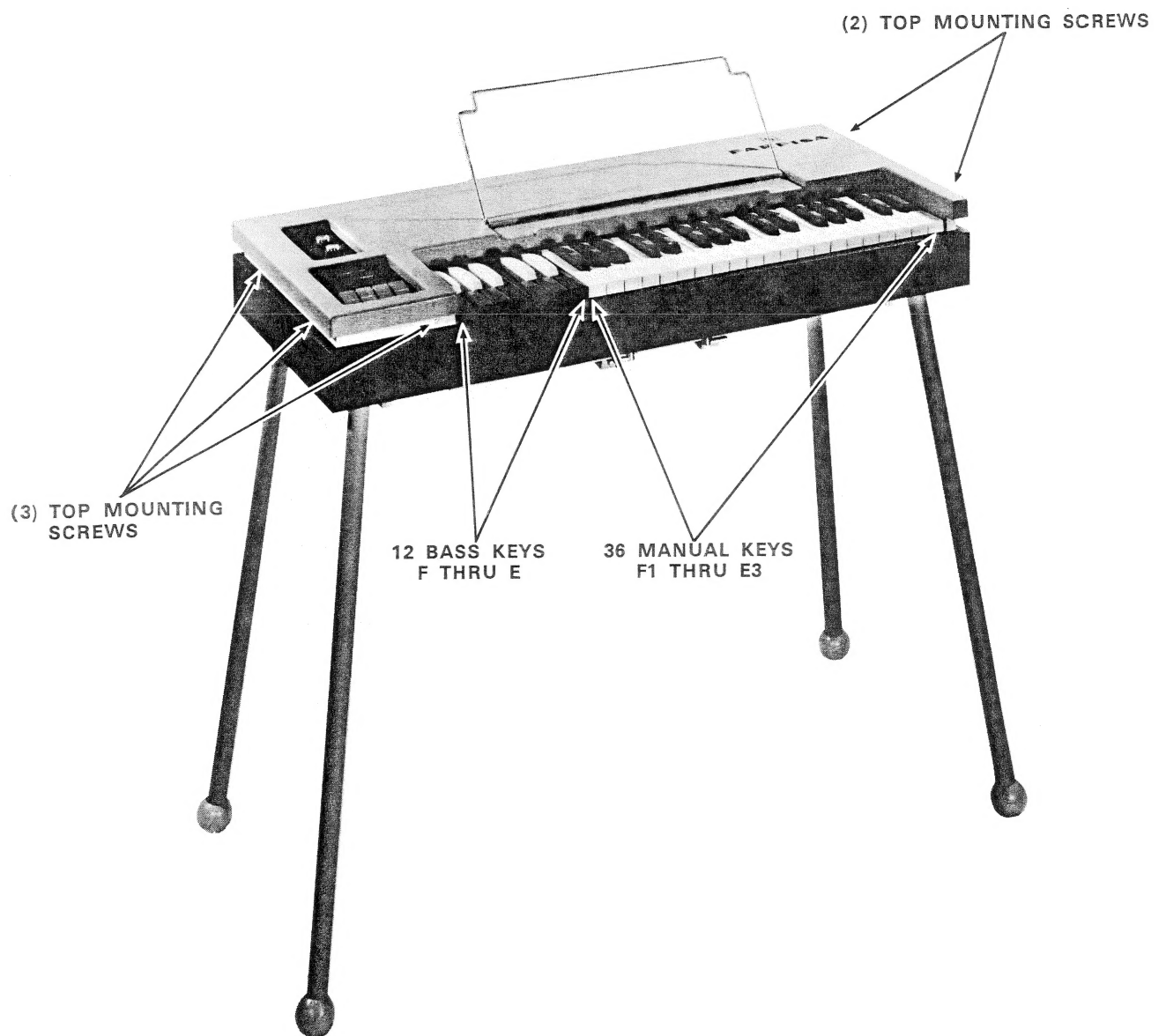


- NOTES:**
1. All tone generator resistors 1/2 watt 5%.
  2. All capacitors are in microfarads unless otherwise specified.
  3. All voltages measured to ground with a Simpson 260 VOM.
  4. See parts list for component part numbers.
  5. All levers shown in "off" position.
  6. All levers shown in "on" position.
  7. Wasting time is almost like wasting life.

FARFISA COMPACT  
C2/143  
Dwg No 1 Model F.A.S.T. 2

## FAST 2

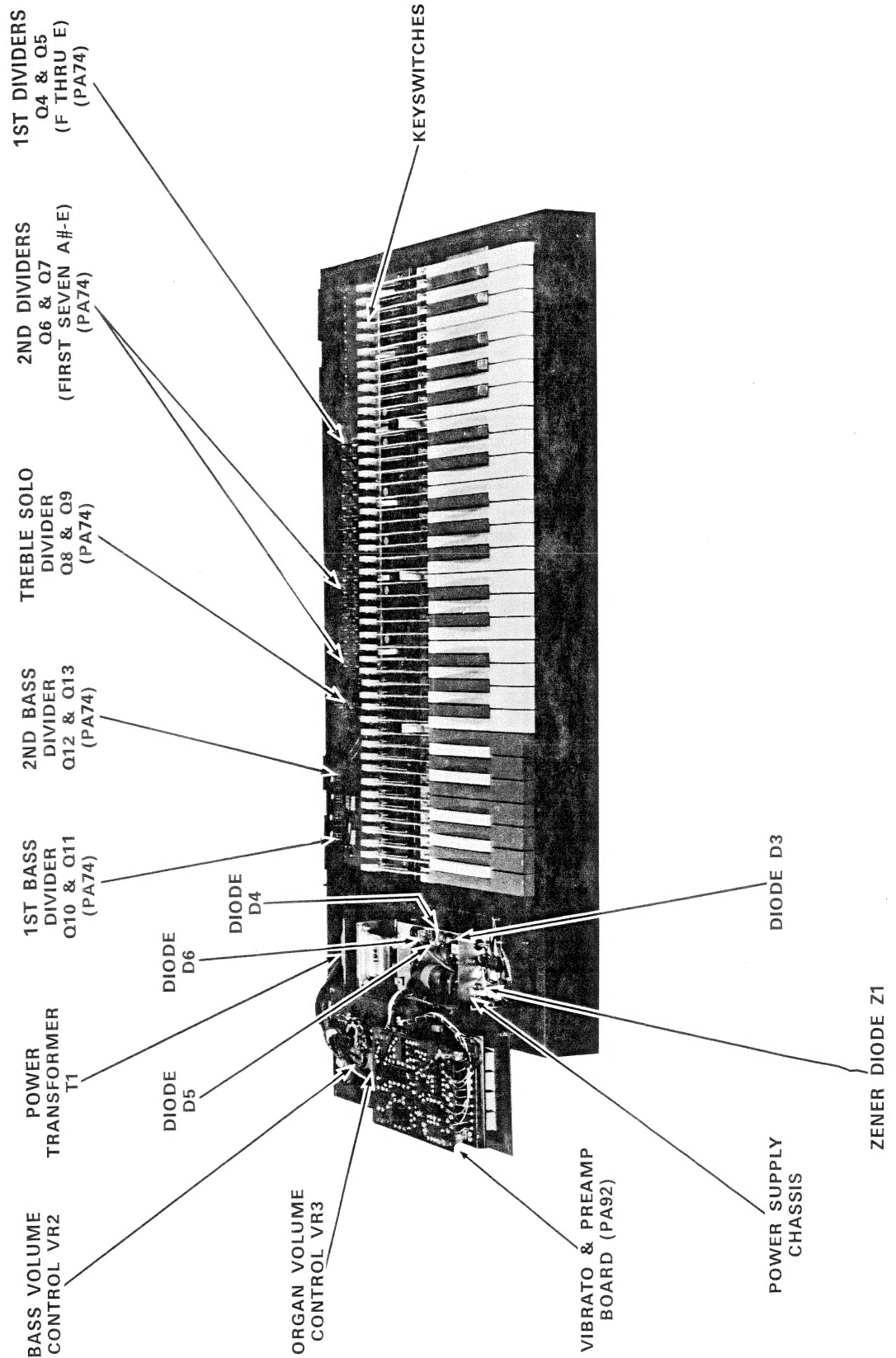
### FRONT VIEW FAST 2





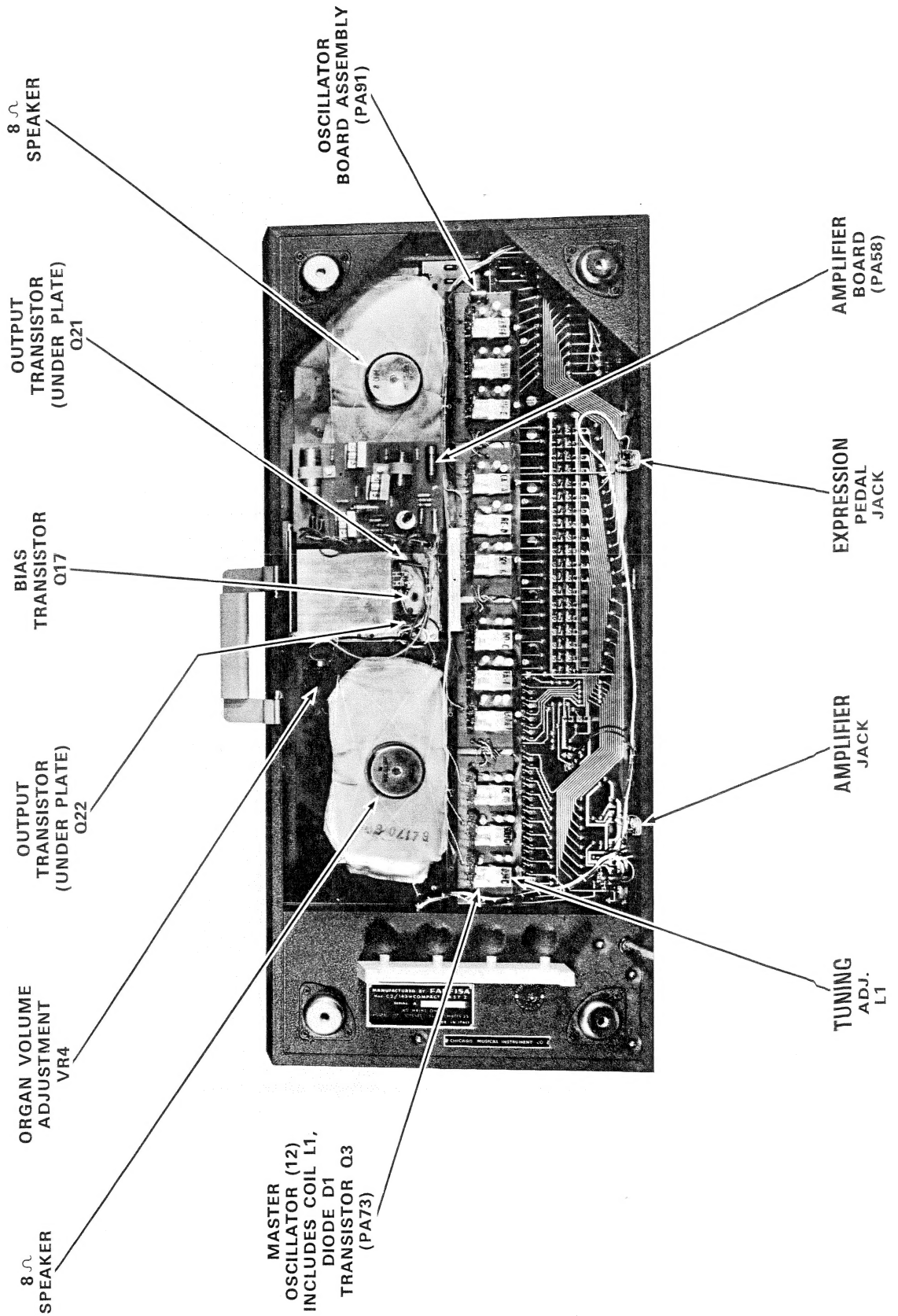
# FAST 2

## TOP VIEW (Power Supply Exposed) FAST 2



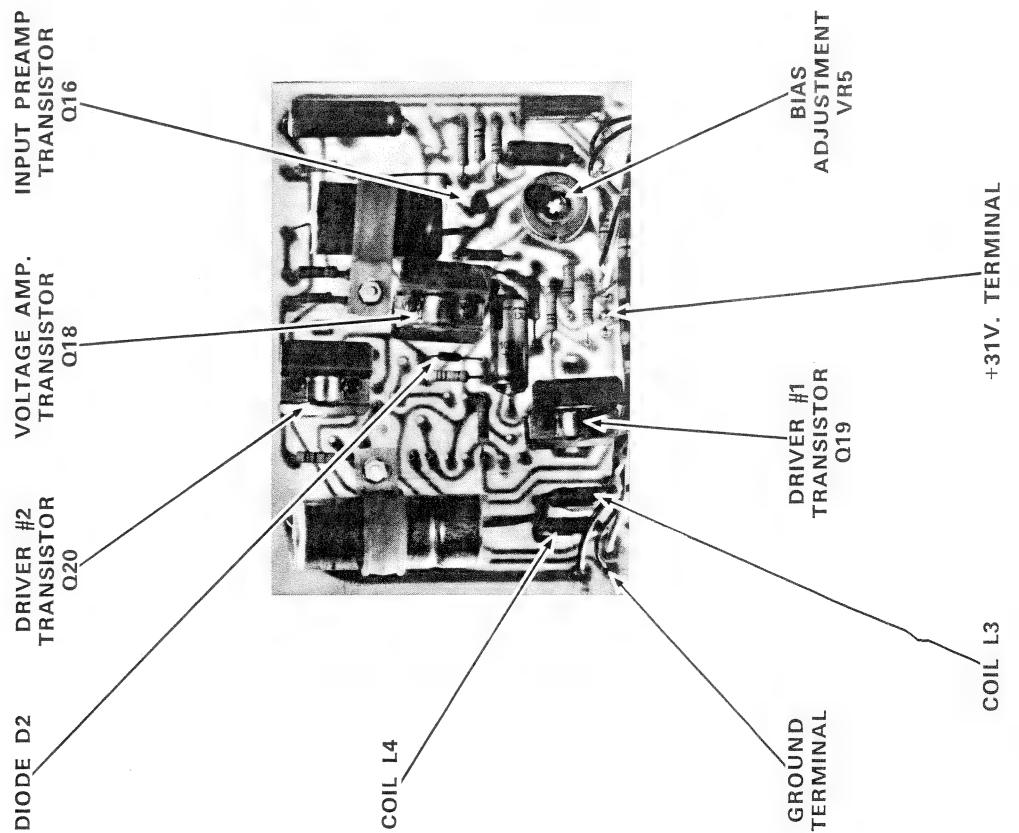
## FAST 2

### BOTTOM VIEW FAST 2

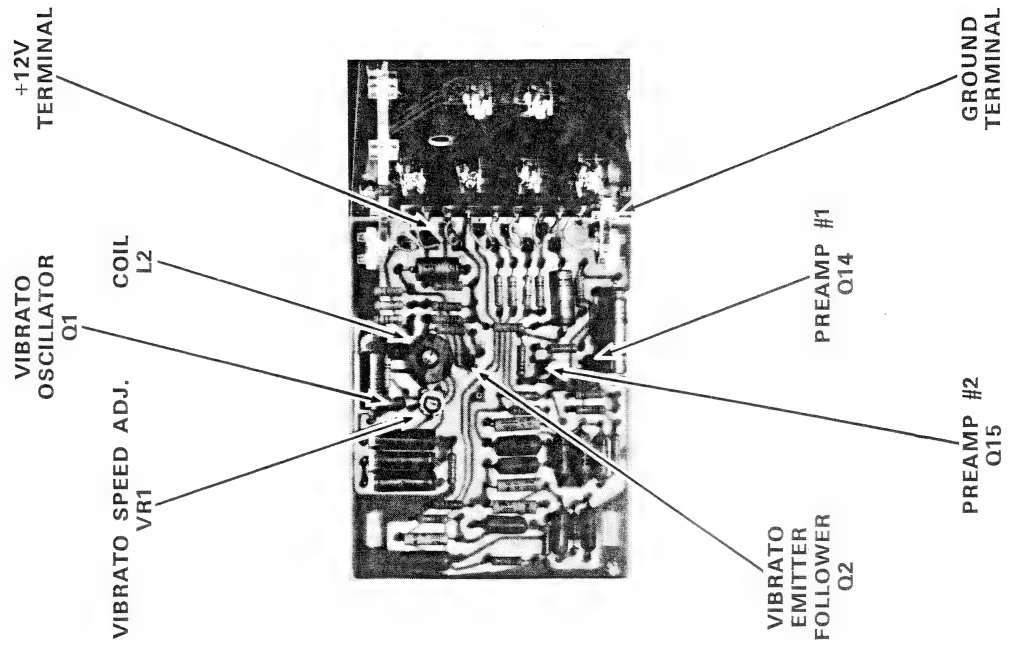


## FAST 2

### AMPLIFIER BOARD FAST 2 (PA58)



### VIBRATO & PREAMP BOARD FAST 2 (PA92)





# FAST 3

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## SPECIFICATIONS

Keyboard: 49 notes C to C  
Manual Bass: 12 notes C to B  
Overall Volume Control  
Optional Swell Pedal

#### Voice Stops (violet tabs):

Bass 16'  
Clarinet 16'  
Flute 8'  
Oboe 8'  
Trumpet 8'  
Strings 8'  
Flute 4'

#### Vibrato Stops (blue tabs):

Vibrato On/Off  
Slow / Fast

Manual Bass Selector tab

Manual Bass Volume Balance Control tab

Mains Switch

Pilot Light

Mains Voltage (for USA and CANADA): 117 Volt AC

Dimensions: 31" x 17" x 32.5"

Weight: 44 lbs. — 20 Kg.

Metal cabinet covered with washable vinyl—plastic edges—metal folding legs—retractable carrying handle—removable music rack.

## ADJUSTMENTS FAST 3

### VR1 VIBRATO SPEED

Vibrato speed may be adjusted using a small regular screwdriver. Proper speed is between 6-7 Hertz with the Vibrato speed tabswitch set in the Fast position.

### VR3 D. C. BALANCE

A slight amount of D. C. voltage is supplied through the D. C. Balance Adj. to the 16'-8'-4' manual key-switches. This is done to minimize key click. To adjust the D. C. Balance:

1. Turn on the Flute 4', Flute 8' and Bass 16' Tab-switches.
2. Repeatedly depress several manual keys while turning the D. C. Balance Adj. (Use a small regular screwdriver.)
3. Set Adjustment at point of least amount of D. C. click.

### L1 TUNING

The 12 Tone Generator Master Oscillator circuits determine the pitch of the entire organ. Adjusting any one of the Master Oscillator tuning adjustments will tune all the notes of that tone generator. Tuning any group of 12 notes automatically tunes the entire organ.

Tuning may be accomplished by using a small non-conductive screwdriver and one of the following methods:

1. Set of 12 Tuning Forks: Zero beat the note of the organ to be tuned to the sound of the corresponding tuning fork. This is a highly accurate tuning method.
2. Strobo Conn or Strobo Tuner: This is done by visual observation of a strob pattern. Simply follow directions supplied with the Strobotuner. This is a highly accurate tuning method.
3. Another instrument: Zero beat the note of the organ to be tuned to the sound of a corresponding note on an "in tune" instrument (piano, organ, accordion, etc.) Accuracy is dependent upon the tuning of the other instruments. This method is especially desirable when the other instrument is to be played with the organ.
4. One Tuning Fork: One tuning fork is used to set the "temperment" (one note). The other 11 notes are set by ear using the number of beats between "4ths" and "5ths". This requires a trained ear. Accuracy is dependent upon the tuner.

## TRANSISTOR VOLTAGES

Q No.	Circuit	Collector	Emitter	Base
Q1	Vib. Oscillator	+5V*	+8.4V	+7.5V
Q2	Vib. Emitter Follower	$\phi$ V	+2.5V*	+2V*
Q3	Master Oscillator	+1.8V	+7.4V	+7.4V
Q4	Buffer	+3.6V	+8.4V	+8.4V
Q5	1st Divider	+4.4V	+8.4V	+10V
Q6	1st Divider	+4.4V	+8.4V	+10V
Q7	2nd Divider	+4.4V	+8.4V	+10V
Q8	2nd Divider	+4.4V	+8.4V	+10V
Q9	3rd Divider	+4.4V	+8.4V	+10V
Q10	3rd Divider	+4.4V	+8.4V	+10V
Q11	16' Solo Divider	+4.4V	+7.4V	+7.4V
Q12	16' Solo Divider	+4.4V	+7.4V	+7.4V
Q13	Preamp #1	+6V	+2V	+1V
Q14	Preamp #2	+4.4V	+2V	+1V
Q15	Output Preamp	+4.4V	+1.5V	+2V

\*Pulse Voltage

### IMPORTANT

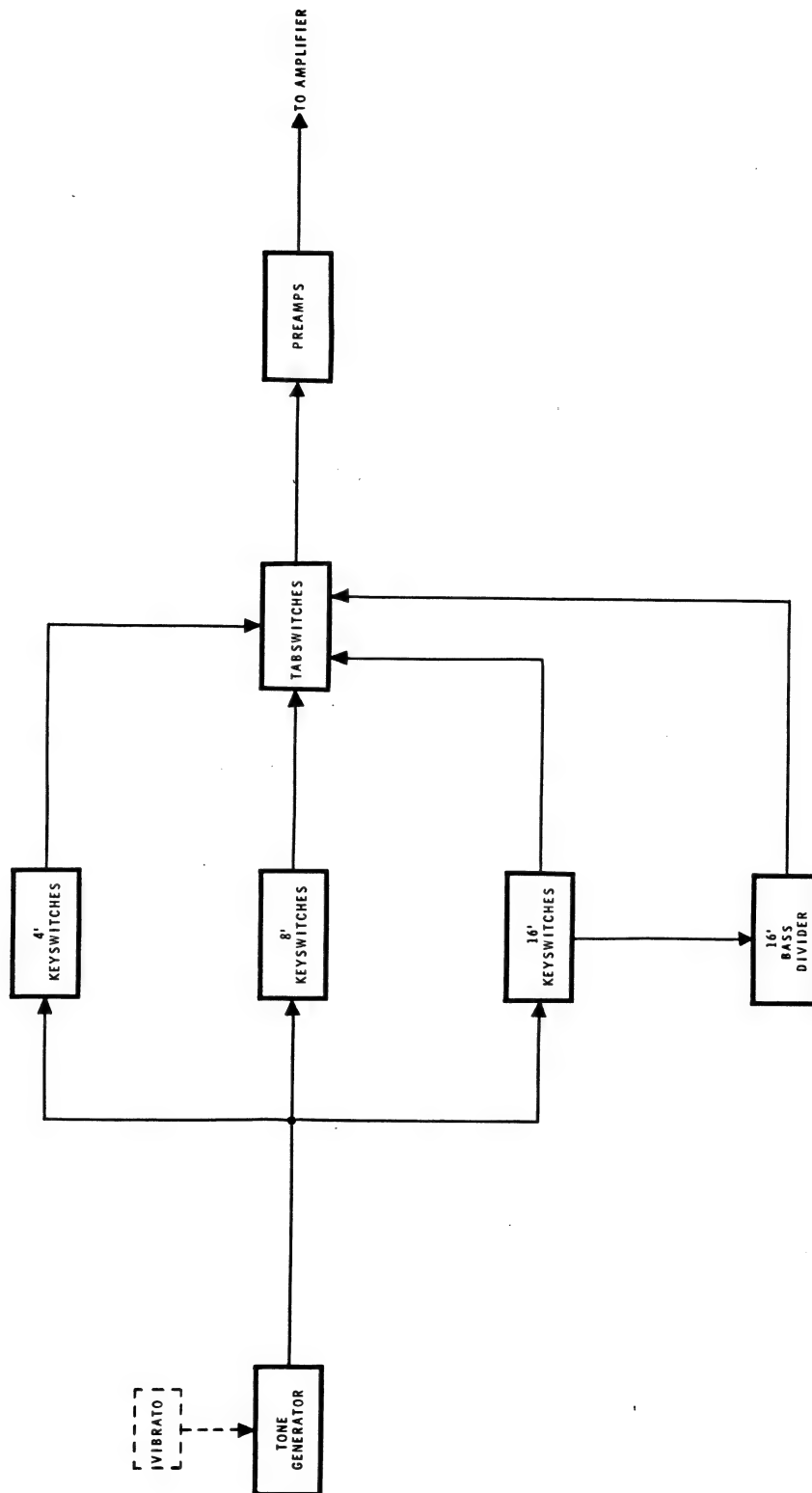
The above voltage readings were measured to ground with a Simpson Model 260 V.O.M. Voltage readings shown are intended only as a guide in troubleshooting. Voltages will vary from organ to organ due to normal manufacturing tolerances.

### CAUTION

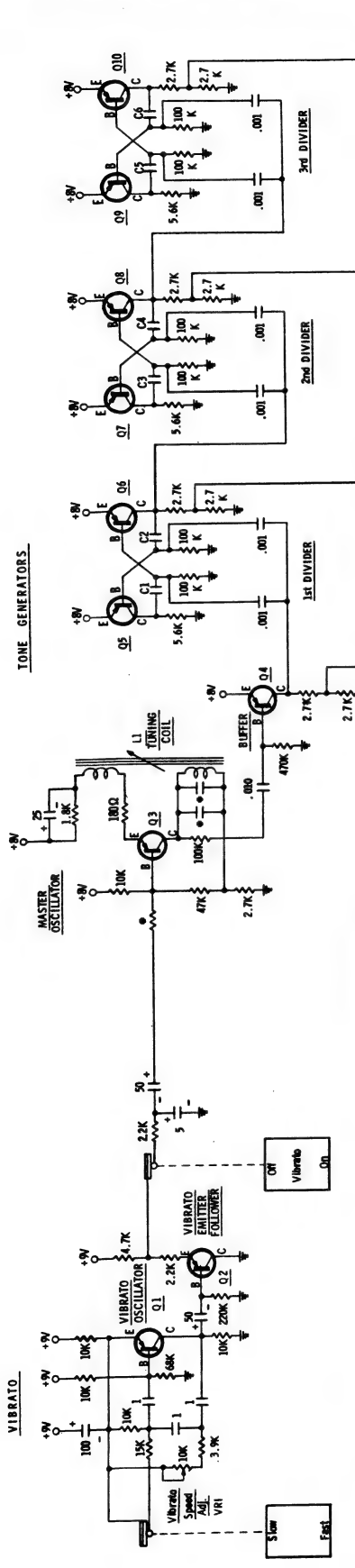
Exercise extreme care when making voltage measurements. Accidental shorting of transistor leads may damage the transistor.



**BLOCK DIAGRAM**  
**F.A.S.T. 3**

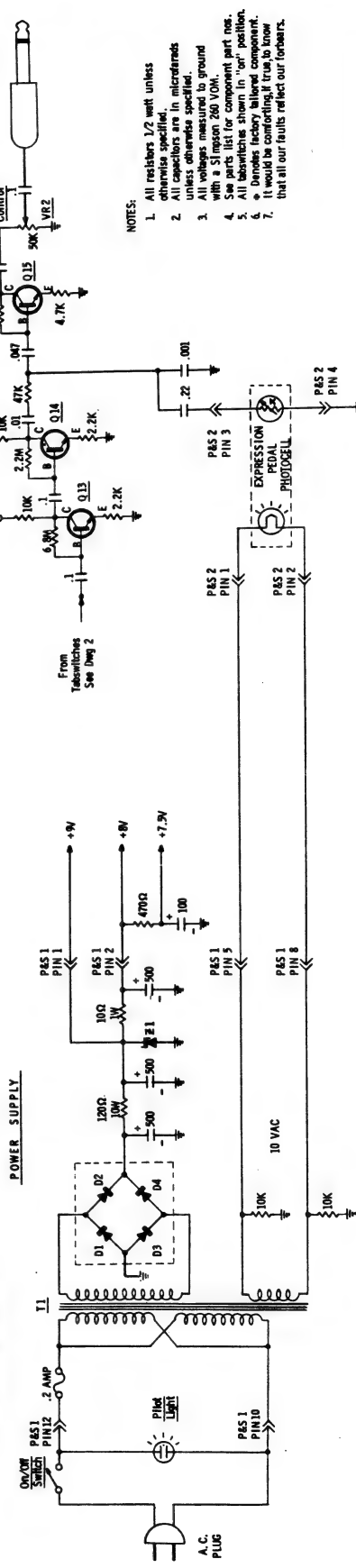


**LEGEND**  
 SIGNAL FLOW →  
 [ CONTROL ]



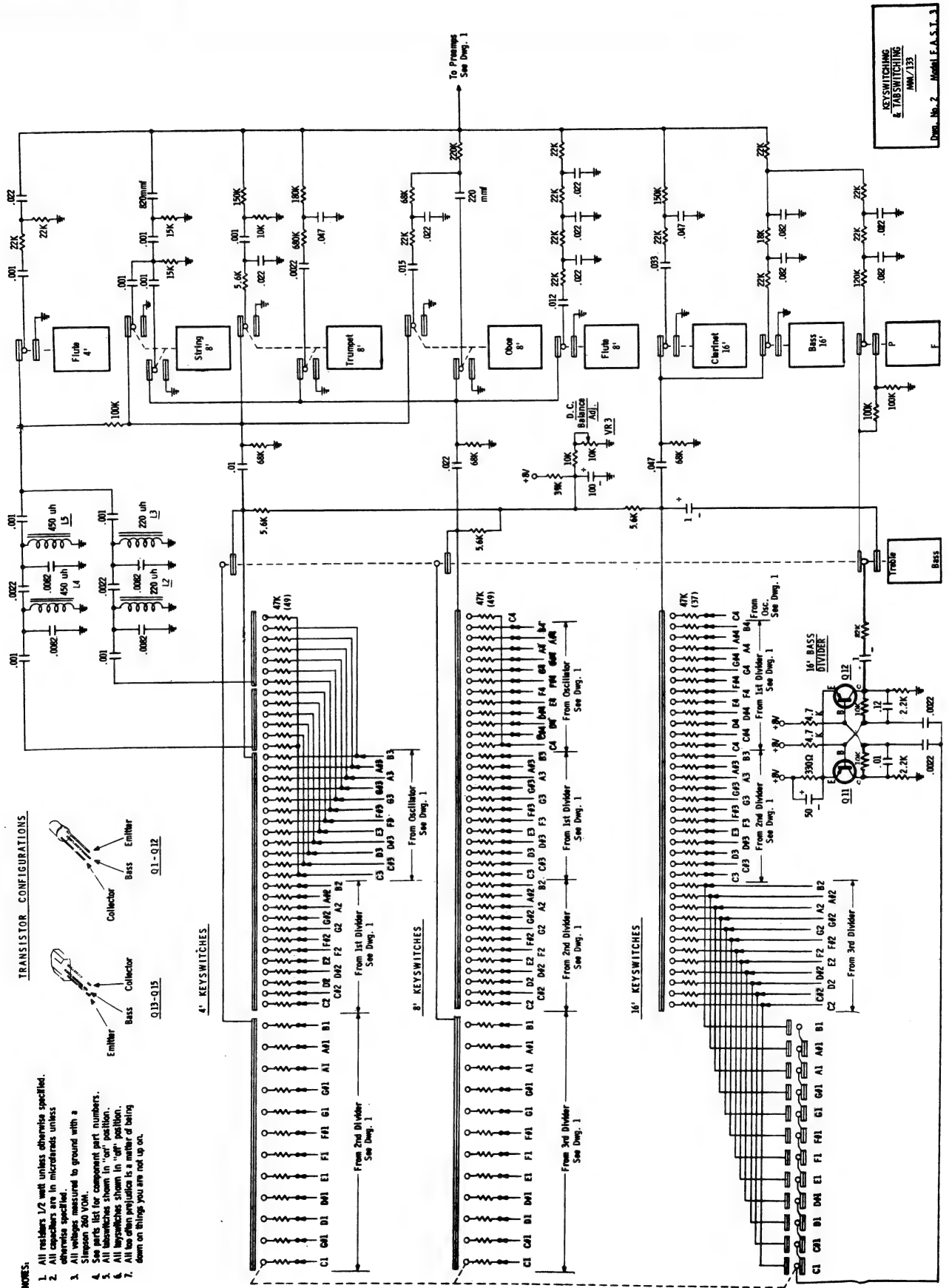
MASTER OSCILLATOR TUNING COMPONENTS				
NOTE	C1-C2	C3-C4	C5-C6	
A	.002	.001	.001	
B	.002	.001	.001	
C	.002	.001	.001	
D	.002	.001	.001	
E	.002	.001	.001	
F	.002	.001	.001	
G	.002	.001	.001	
A	.002	.001	.001	
B	.002	.001	.001	

PLUG & SOCKET CONNECTIONS		INFORMATION
PBS 1	Pin 1	To Vibrato
PBS 2	Pin 2	To Vibrato
PBS 3	Pin 3	To Vibrato
PBS 4	Pin 4	To Vibrato
PBS 5	Pin 5	To Vibrato
PBS 6	Pin 6	To Vibrato
PBS 7	Pin 7	To Vibrato
PBS 8	Pin 8	To Vibrato
PBS 9	Pin 9	To Vibrato
PBS 10	Pin 10	To Vibrato
PBS 11	Pin 11	To Vibrato
PBS 12	Pin 12	To Vibrato
PBS 13	Pin 13	To Vibrato
PBS 14	Pin 14	To Vibrato
PBS 15	Pin 15	To Vibrato
PBS 16	Pin 16	To Vibrato
PBS 17	Pin 17	To Vibrato
PBS 18	Pin 18	To Vibrato
PBS 19	Pin 19	To Vibrato
PBS 20	Pin 20	To Vibrato
PBS 21	Pin 21	To Vibrato
PBS 22	Pin 22	To Vibrato
PBS 23	Pin 23	To Vibrato
PBS 24	Pin 24	To Vibrato
PBS 25	Pin 25	To Vibrato
PBS 26	Pin 26	To Vibrato
PBS 27	Pin 27	To Vibrato
PBS 28	Pin 28	To Vibrato
PBS 29	Pin 29	To Vibrato
PBS 30	Pin 30	To Vibrato



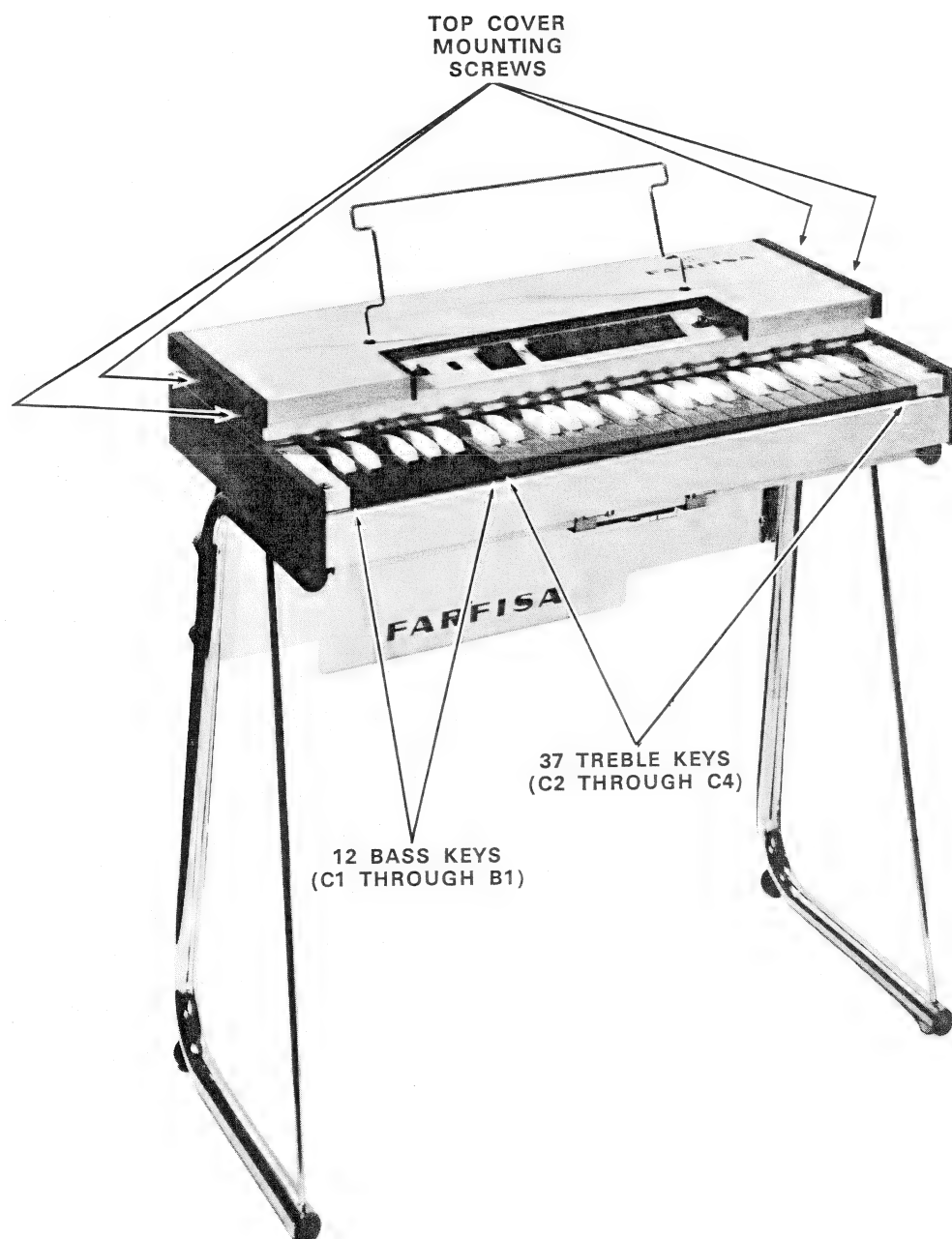
- NOTES:
1. All resistors 1/2 watt unless otherwise specified.
  2. All capacitors are in microfarads unless otherwise specified.
  3. All voltages measured to ground with a Simpson 260 VOM.
  4. See parts list for component part nos.
  5. All tabulated values shown in "on" position.
  6. It would be comforting if true to know that all our faults reflect our former.

TONE GENERATORS  
VIBRATO, PREAMPS  
& POWER SUPPLY  
MM/133  
Diag. No. 1 Model F.A.S.T.3



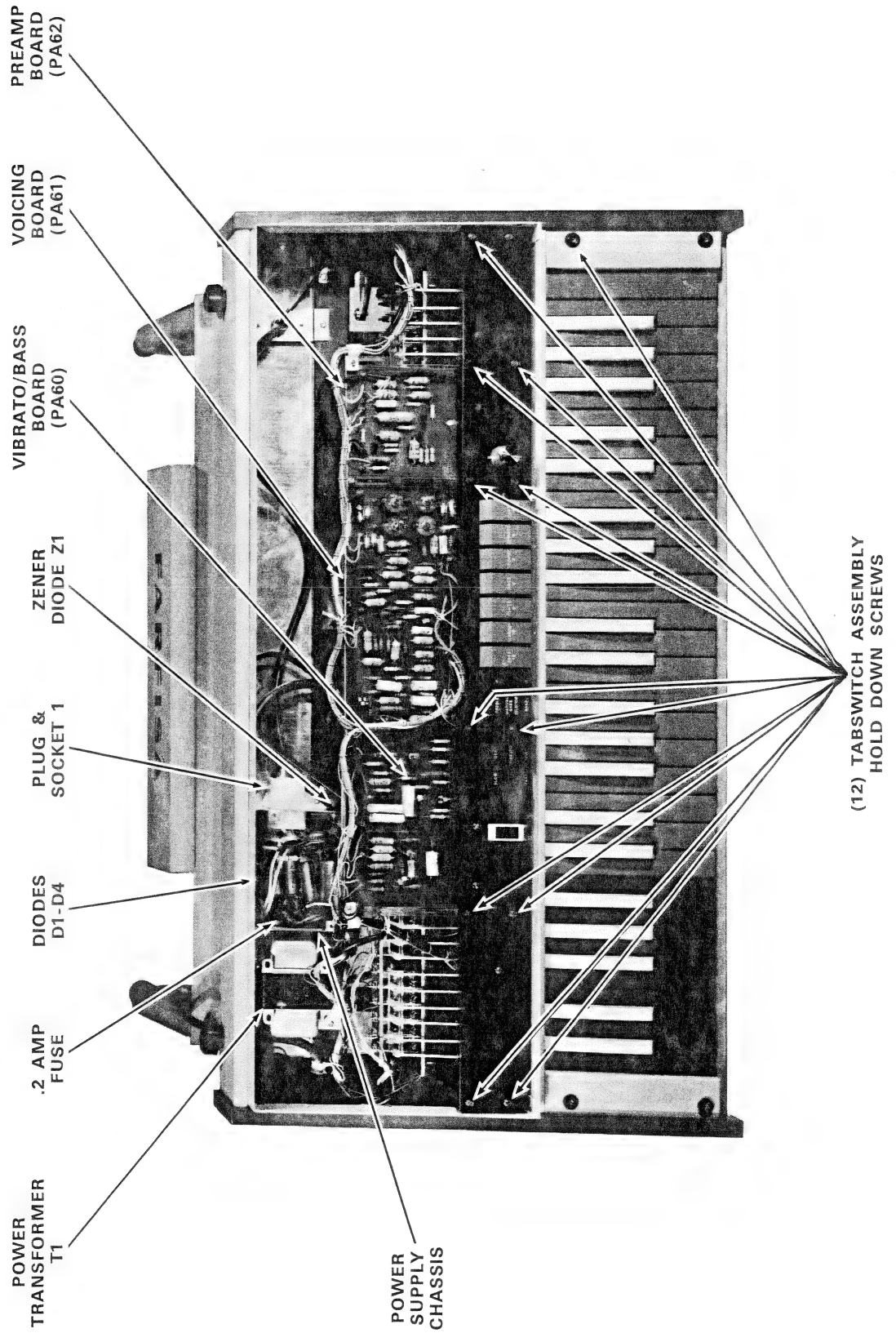
## FAST 3

### FRONT VIEW FAST 3



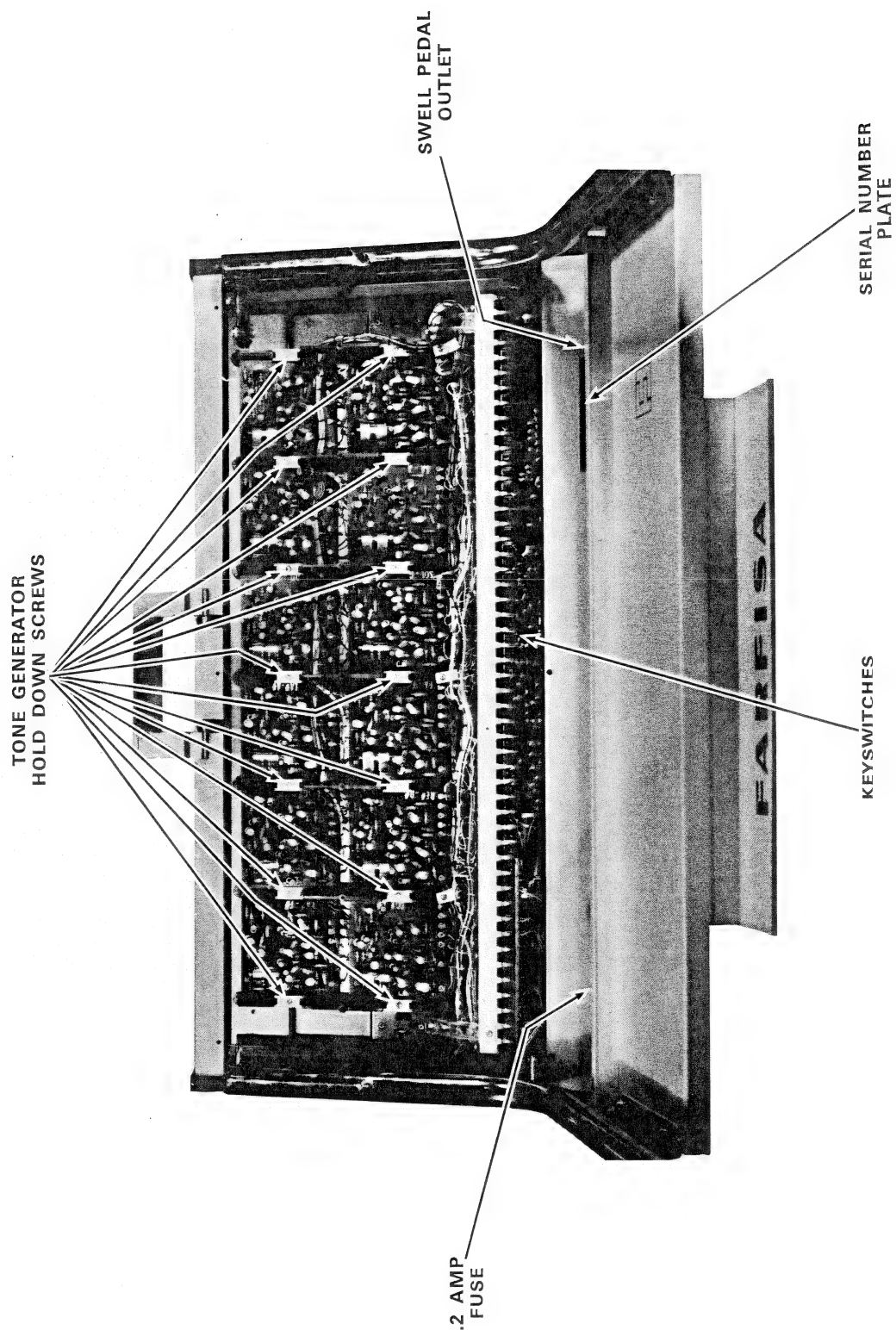
# FAST 3

## TOP VIEW FAST 3 (With Cover Removed)



## FAST 3

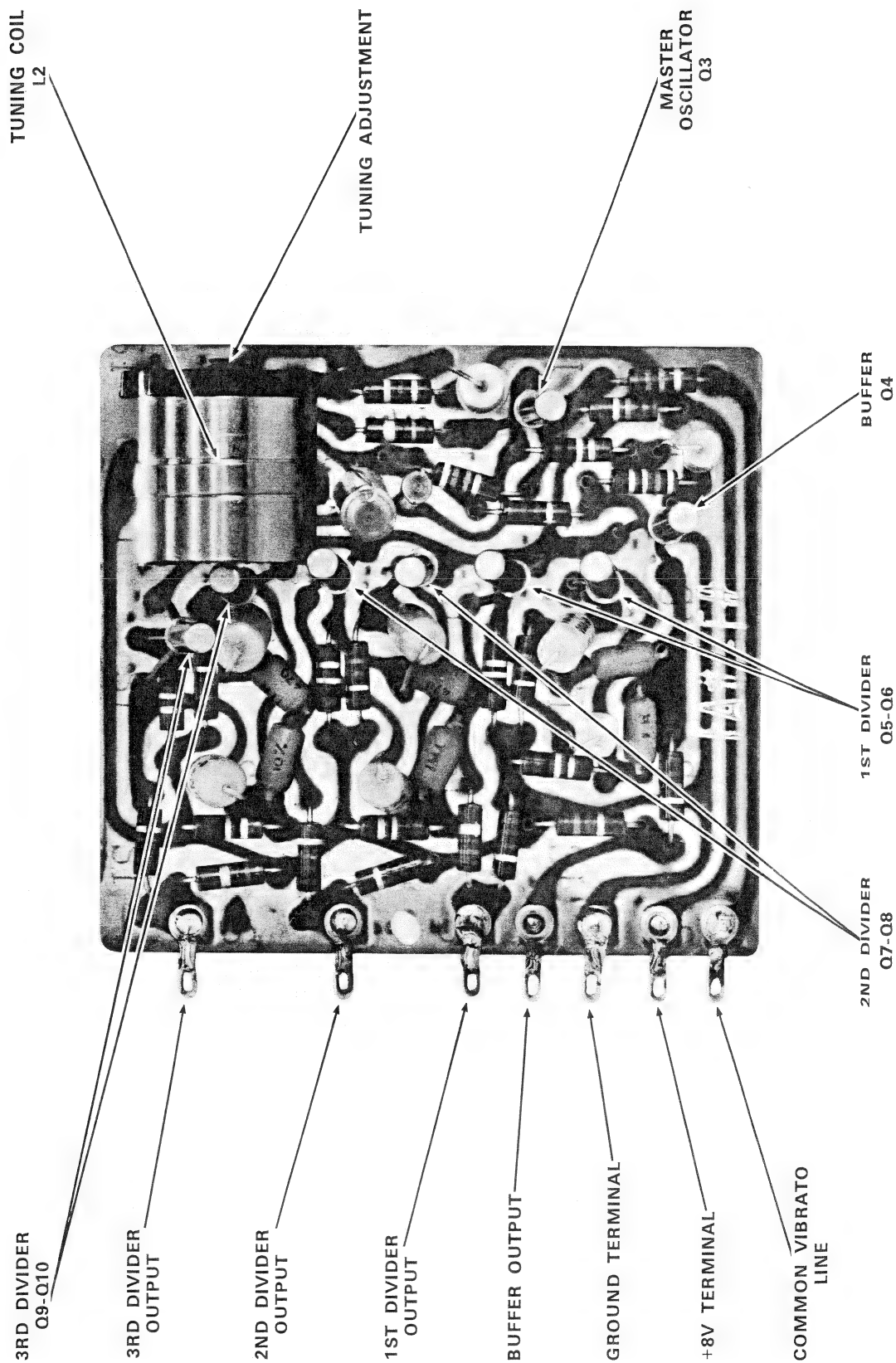
### BOTTOM VIEW FAST 3





# FAST 3

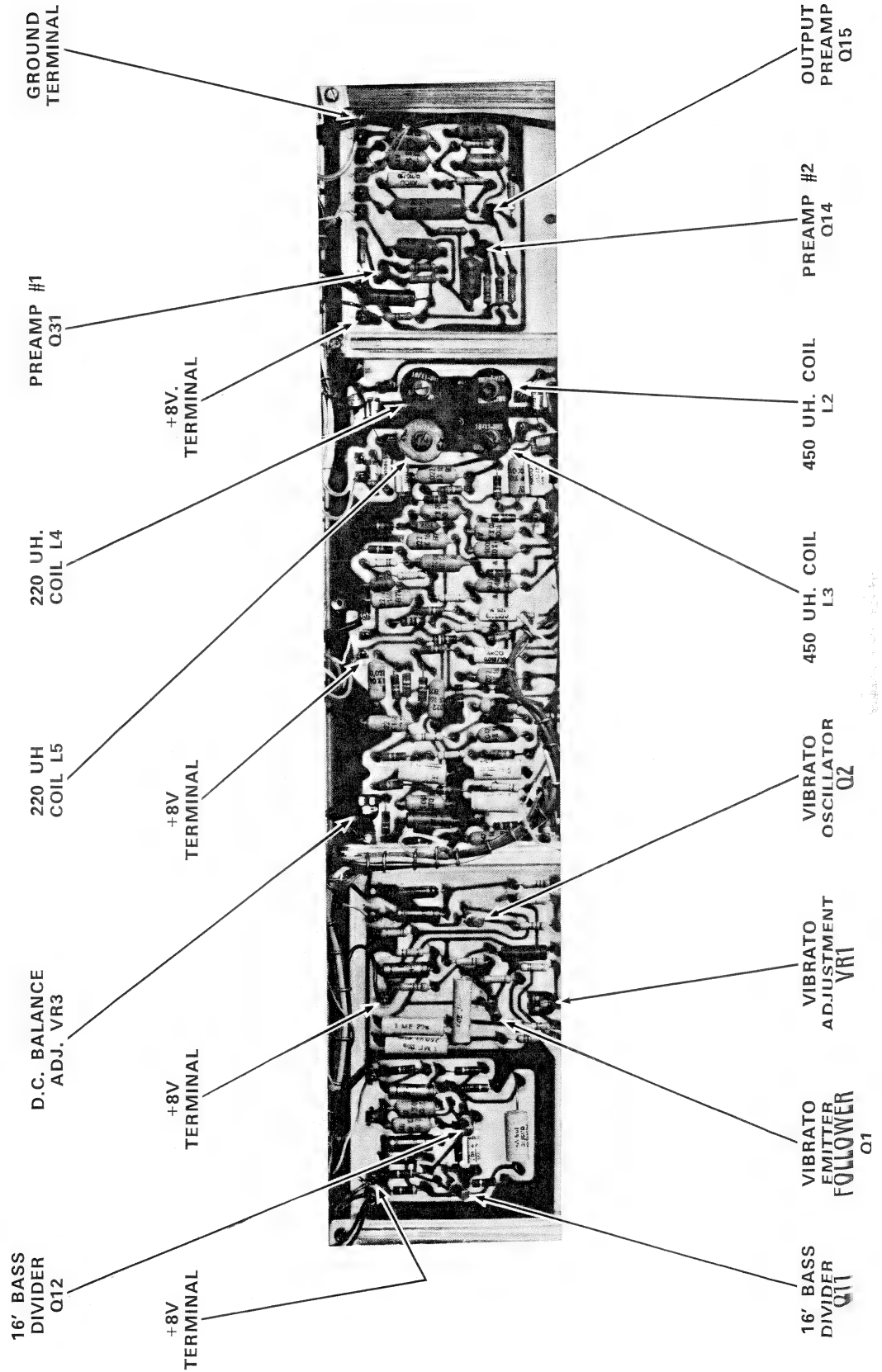
## TONE GENERATOR BOARD FAST 3 (PA23)





# FAST 3

## VIBRATO/BASS, VOICING & PREAMP BOARDS FAST 3



# FAST 4 & 5

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## FAST 4 & 5

### SPECIFICATIONS

Keyboard: C to C  
Manual Bass: C1 to B1  
Extended Bass: C2 to B2

Voice Stops (violet tabs):

Bass 16'  
Bass Clarinet 16'  
Flute 8'  
Oboe 8'  
Trumpet 8'  
Strings 8'  
Flute 4'  
Piccolo 4'

Mixture Stops (violet tabs):

Mixture (mixed frequencies of 5-1/3' and 2-2/3')  
Mixture: Brilliant

Vibrato Stops (blue tabs):

Vibrato On/Off  
Slow / Fast  
Light / Heavy

Percussion Stops (orange tabs):

Manual Bass On/Off  
Treble On/Off  
Long / Short  
Mixture On/Off  
Mixture Soft / Sharp

Sustain Stops (yellow tabs) Fast 5 Only:

Celest 8'  
Clavicord 8'  
Kinura 8'

Manual Bass Selector (dark-grey tab):

Bass / Treble

Pedal and Manual Bass Sound (black tab):

Soft / Sharp

Rotating General Volume Control

Swell Pedal Volume Control

Mains Switch and Pilot Light

Mains Voltage: 117 Volt AC

Dimensions: 37" x 17" x 36"

Weight: 62 lbs.

Metal cabinet covered with washable vinyl—plastic edges—chromed folding legs—retractable carrying handle—removable music rack—socket for head-phone—socket for the connection of an optional 13-note pedalboard—carrying bag supplied with the instrument.

## FAST 4 & 5

### ADJUSTMENTS FAST 4 & 5

#### VR1 VIBRATO SPEED

Vibrato speed may be adjusted using a small regular screwdriver. Proper speed is between 6-7 Hertz with the Vibrato speed tabswitch set in the Fast position.

#### VR2 VOLTAGE

This adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. To adjust, connect a D.C. voltmeter to supply voltage "A", then set the adjustment so that the meter reads +12 volts. Improper voltage adjustment will result in unstable tone generator operation. Always check the "A" supply voltage before servicing tone generators.

#### VR3 STABILITY

The stability adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. This adjustment has a wide range of normal operation. Only extreme settings on this adjustment will result in unstable Power Supply operation.

#### VR5-VR9, VR12 & VR13 FILTERS

These adjustments are carefully set at the factory! Readjustment should not be necessary unless Filter components are replaced. To adjust a filter: First, connect an A.C. voltmeter across the speakers in the amplifier to which the organ is connected. Then, with a clip lead, ground the transistor collector lead of the filter requiring adjustment. While the filter is grounded—and using one flute tabswitch at a time—locate a group of dead keys on the keyboard and hold down one key at or near the center of this group. Next, while holding the note, remove the clip lead from the filter transistor. Now with the note playing, adjust the A.C. meter range so that the meter needle reads near center scale. (Use any meter range and organ volume combination that is convenient.) With the note still playing, set the filter adjustment to a point that gives the maximum increase in A.C. voltage.

#### VR10, VR11 PERCUSSION LENGTH & ATTACK

These two adjustments affect each other. Adjustment of either one changes the other. Proper adjustment is achieved when the percussion functions with the least key pop and with a distinct difference in percussion length between short and long percussion tabswitch settings. Extreme adjustment of either length or attack will result in **no percussion**. Always try adjusting percussion before servicing the percussion circuits.

#### L1 TUNING

The 12 Tone Generator Master Oscillator circuits determine the pitch of the entire organ. Adjusting any one of the Master Oscillator tuning adjustments will tune all the notes of that tone generator. Tuning any group of 12 notes automatically tunes the entire organ.

Tuning may be accomplished by using a small non-conductive screwdriver and one of the following methods:

1. Set of 12 Tuning Forks: Zero beat the note of the organ to be tuned to the sound of the corresponding tuning fork. This is a highly accurate method for tuning.
2. Strobo Conn or Strobo Tuner: This is done by visual observation of a strob pattern. Simply follow directions supplied with the Strobotuner. This is a highly accurate tuning method.
3. Another instrument: Zero beat the note of the organ to be tuned to the sound of a corresponding note on an "in tune" instrument (piano, organ, accordion, etc.) Accuracy is dependent upon the tuning of the other instruments. This method is especially desirable when the other instrument is to be played with the organ.
4. One Tuning Fork: One tuning fork is used to set the "temperment" (one note). The other 11 notes are set by ear using the number of beats between "4ths" and "5ths". This requires a trained ear. Accuracy is dependent upon the tuner.

# FAST 4 & 5

## TRANSISTOR VOLTAGES

Q No.	Circuit	Collector	Emitter	Base
Q1	Master Oscillator	+2.2	+12	+12
Q2	1st Divider	+5.5	+1	+1.2
Q3	1st Divider	+5.5	+1	+1.2
Q4	2nd Divider	+5.5	+1	+1.2
Q5	2nd Divider	+5.5	+1	+1.2
Q6	3rd Divider	+5.5	+1	+1.2
Q7	3rd Divider	+5.5	+1	+1.2
Q8	4th Divider	+5.5	+1	+1.2
Q9	4th Divider	+5.5	+1	+1.2
Q10	5th Divider	+5.5	+1	+1.2
Q11	5th Divider	+5.5	+1	+1.2
Q12	Vibrato Oscillator	+5.2*	+2.6	+2.8
Q13	Emitter Follower	+12	+4.5*	+1.8*
Q14	Voltage Sensor	-12	+5.6	+5
Q15	Voltage Regulator	φ	-12	-12
Q16	Voltage Regulator	φ	-12	-12
Q17	16' Solo Divider	+10/+5.5	+1	+1.8/+1.3
Q18	16' Solo Divider	+1.2/+5.5	+1	+9/+1.3
Q19	Pedal Solo Divider	+1/+5.5	+1	+1.8/+1.3
Q20	Pedal Solo Divider	+10/+5.5	+1	+9/+1.3
Q21	Bass Preamp	+5.5	+8	+1
Q22	3320 Cycles Flute Filter	+5.5	+8	+1
Q23	1660 Cycles Flute Filter	+5.5	+8	+1
Q24	830 Cycles Flute Filter	+5.5	+8	+1
Q25	415 Cycles Flute Filter	+5.5	+8	+1
Q26	207 Cycles Flute Filter	+5.5	+8	+1
Q27	String Preamp	+3.6	+1.1	+1.2
Q27	String Preamp	+5.8	+6	+1
Q28	Trumpet Filter	+6	+6	+1
Q29	Oboe Filter	+5.8	+6	+1
Q30	Treble Preamp	+5.6	+6	+1
Q31	Percussion Pulse Detector	+8	+5	+1.2
Q32	1 Shot Multivibrator	+1	φ	+3
Q33	1 Shot Multivibrator	+11.2	φ	+1
Q34	Percussion Driver	φ	+9.5	+10
Q35	Percussion Keyer	+11.5	+11.5	φ
Q36	Percussion Preamp	+6	+7	+1.2
Q37	Output Preamp	+9	+3	+3.3
Q38	Celest Filter #1	+5.8	+6	+1
Q39	Celest Filter #2	+5.8	+6	+1
Q40	Sustain Voice Preamp #1	+5.8	+6	+1
Q41	Sustain Preamp #2	+6	+6	+1
Q42	16' Solo Preamp	+12/+5.5	φ	φ+ .6
Q43	Muter Preamp #1	+5.6	+6	+1
Q44	Muter Preamp #2	+9	+6.2	+5.6
Q45	Muter Driver	+6.5	φ	φ
Q46	Muter	φ	φ	+5

\*Pulse Voltage

### IMPORTANT

The above voltage readings were measured to ground with a Simpson Model 260 V.O.M. Voltage readings shown are intended only as a guide in troubleshooting. Voltages will vary from organ to organ due to normal manufacturing tolerances.

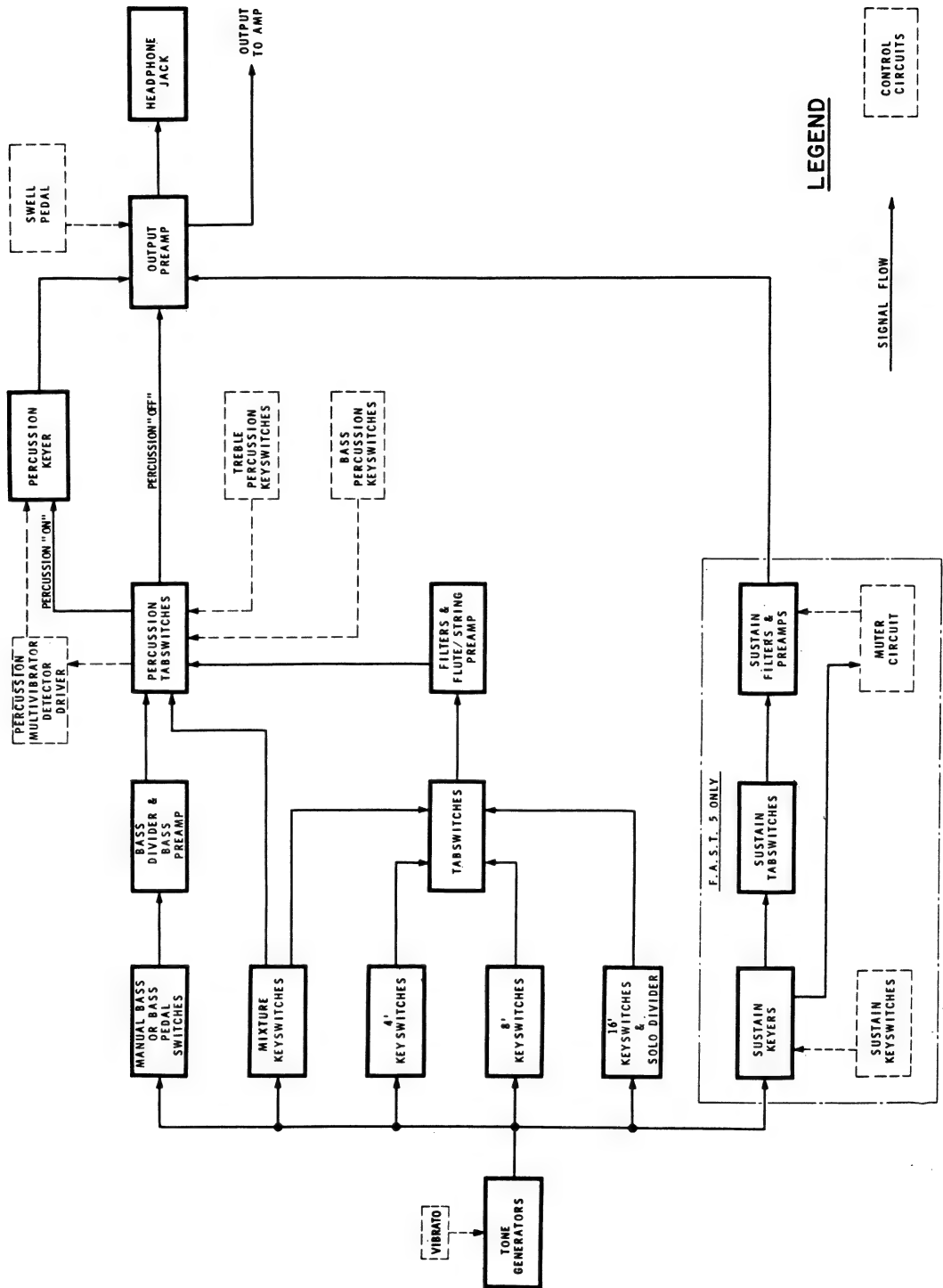
### CAUTION

Exercise extreme care when making voltage measurements. Accidental shorting of transistor leads may damage the transistor.

# FAST 4 & 5

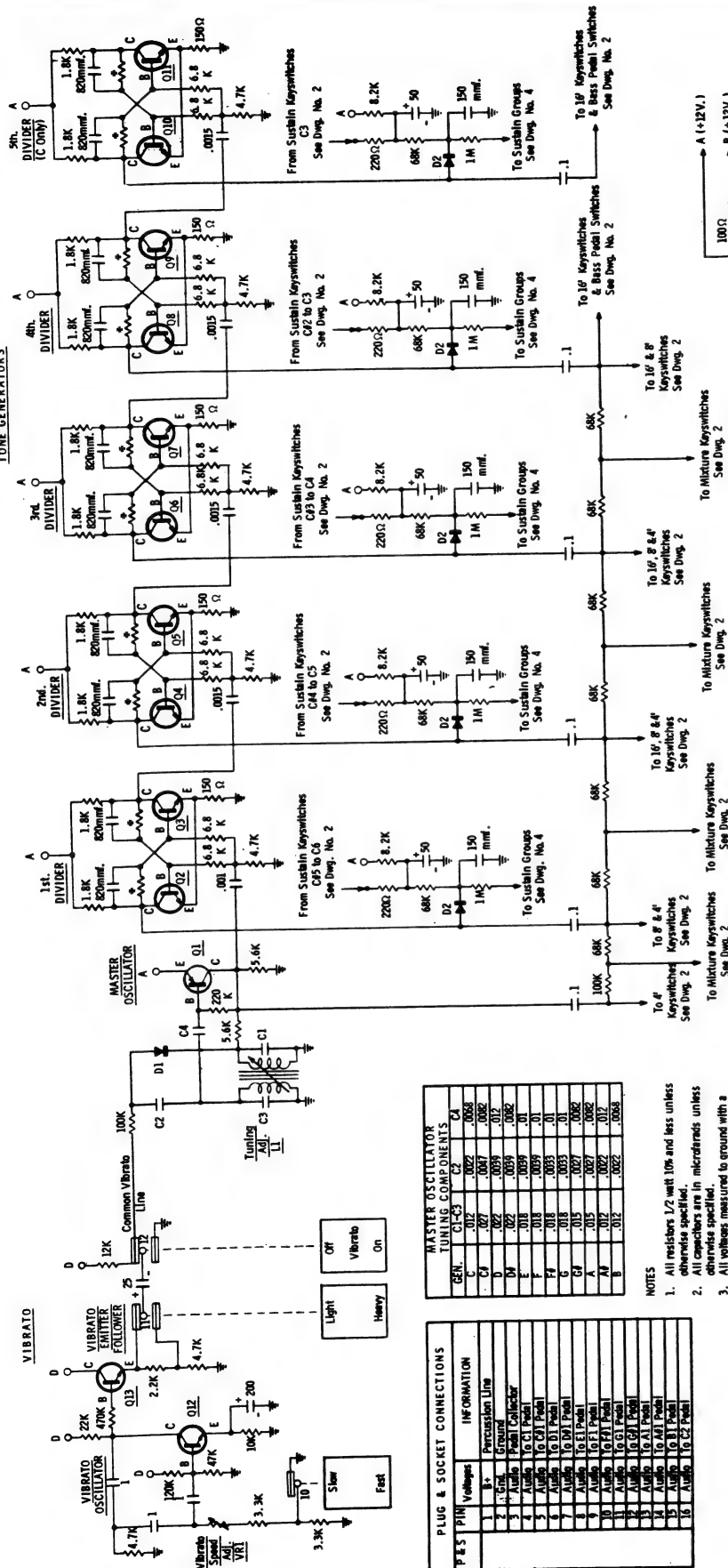
## BLOCK DIAGRAM

FAST 485



# FAST 4 & 5

## TONE GENERATORS

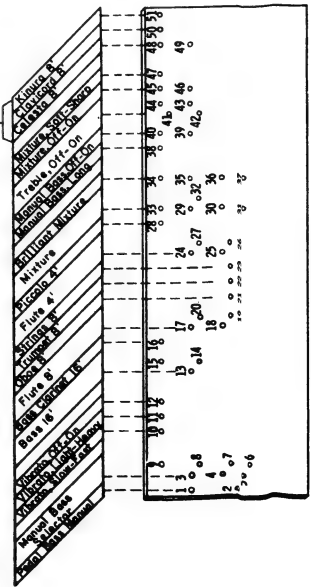


- NOTES
1. All resistors 1/2 watt 10% and less unless otherwise specified.
  2. All capacitors are in microfarads unless otherwise specified.
  3. All voltages measured to ground with a Simpson V.C.T. meter.
  4. See Part 4 for component part numbers.
  5. All capacitors factory balanced component.
  6. All basistypes shown in the on position.
  7. You can't build a reputation on what you are going to do.

MASTER OSCILLATOR TUNING COMPONENTS			
GEN.	C1-C3	C2	C4
C	.002	.0022	.0068
C	.007	.0047	.0062
D	.0022	.0039	.012
D	.0022	.0039	.0062
E	.018	.0039	.01
F	.018	.0039	.01
F	.018	.0039	.01
G	.018	.0039	.0062
G	.018	.0039	.0062
A	.018	.0039	.0062
A	.018	.0039	.0062
B	.012	.0022	.0068

PLUG & SOCKET CONNECTIONS		INFORMATION	
P.S.T. PIN	Voltages	1	2
1	8+	1	2
2	1	3	4
3	Audio	5	6
4	Audio	7	8
5	Audio	9	10
6	Audio	11	12
7	Audio	13	14
8	Audio	15	16
9	Audio	17	18
10	Audio	19	20
11	Audio	21	22
12	Audio	23	24
13	Audio	25	26
14	Audio	27	28
15	Audio	29	30
16	Audio	31	32
17	Audio	33	34
18	Audio	35	36
19	Audio	37	38
20	Audio	39	40
21	Audio	41	42
22	Audio	43	44
23	Audio	45	46
24	Audio	47	48
25	Audio	49	50
26	Audio	51	52
27	Audio	53	54
28	Audio	55	56
29	Audio	57	58
30	Audio	59	60
31	Audio	61	62
32	Audio	63	64
33	Audio	65	66
34	Audio	67	68
35	Audio	69	70
36	Audio	71	72
37	Audio	73	74
38	Audio	75	76
39	Audio	77	78
40	Audio	79	80
41	Audio	81	82
42	Audio	83	84
43	Audio	85	86
44	Audio	87	88
45	Audio	89	90
46	Audio	91	92
47	Audio	93	94
48	Audio	95	96
49	Audio	97	98
50	Audio	99	100

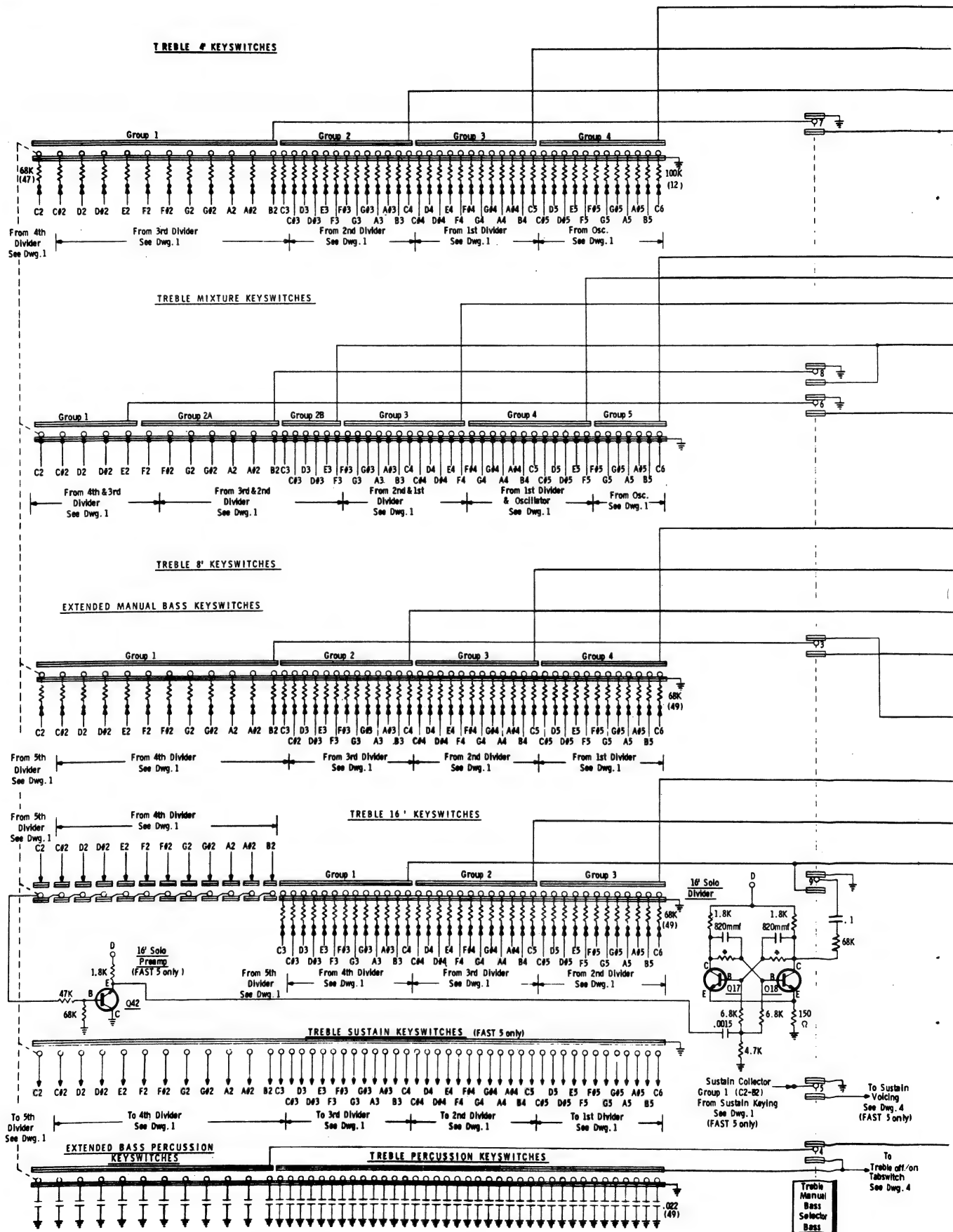
Fast 5 Only



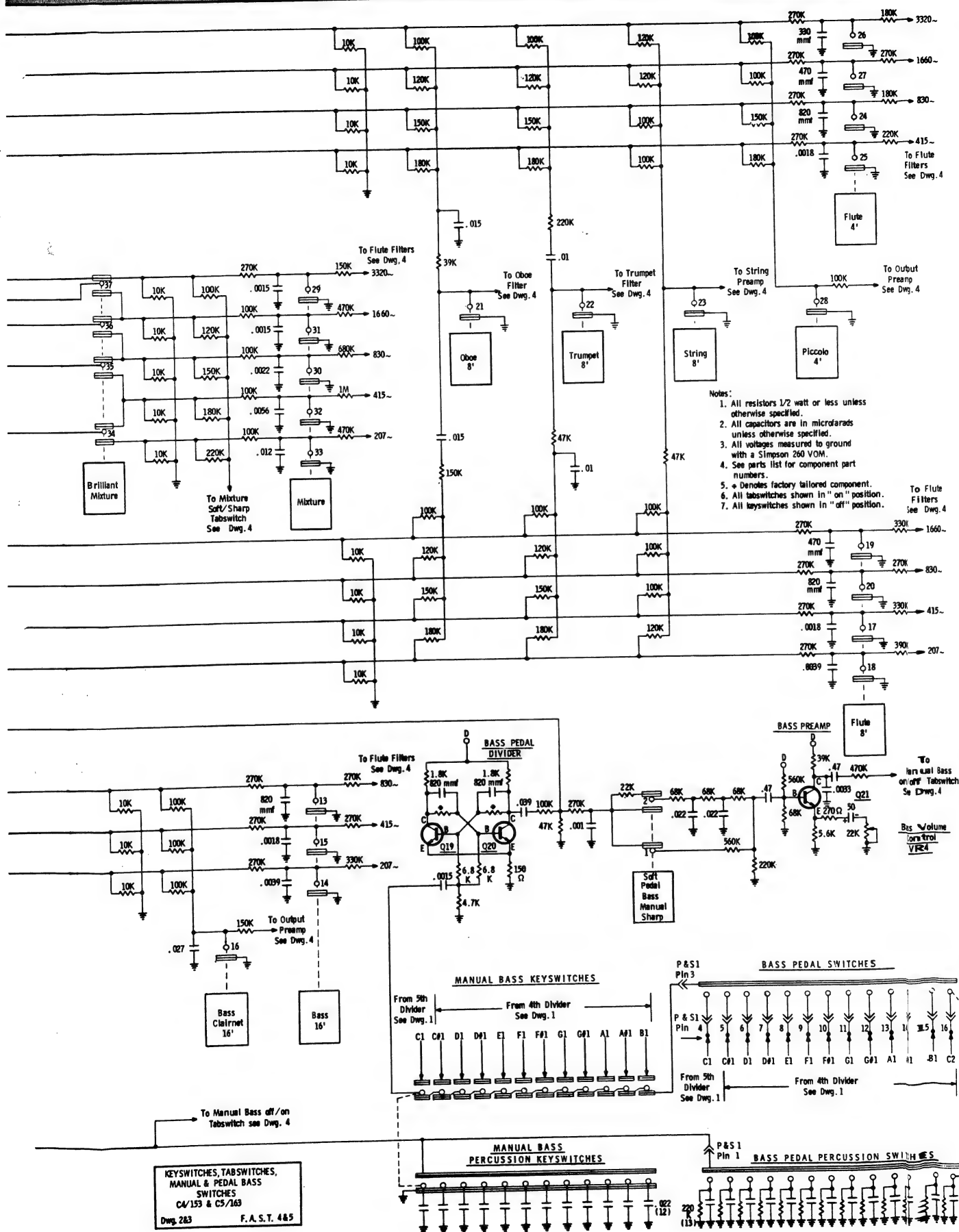
TONE GENERATORS  
VIBRATO & POWER SUPPLY  
CS/103 & CA/103  
Dwg. No. 1 F.A.S.T. 4&5



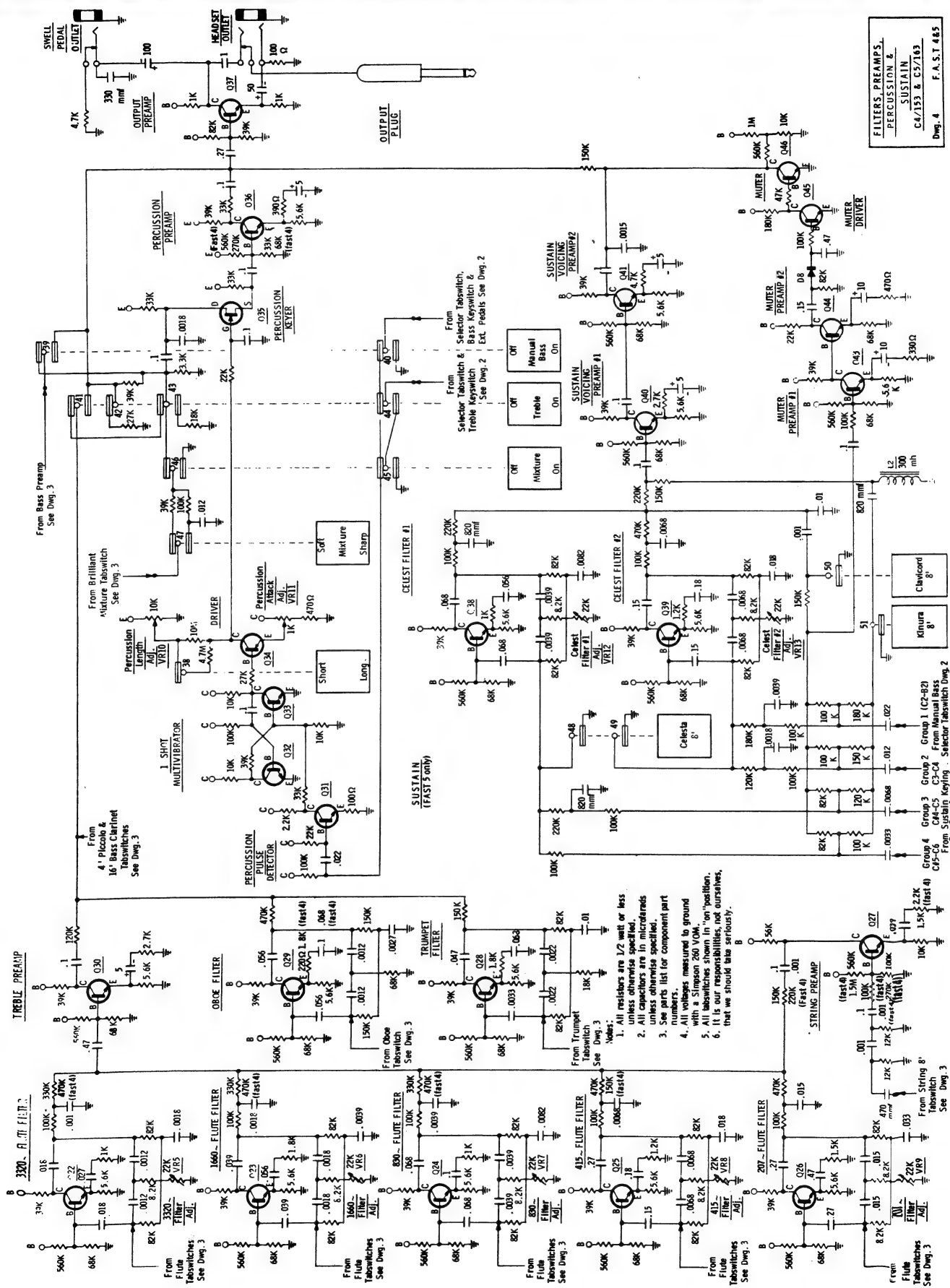
# FAST 4 & 5



# FAST 4 & 5



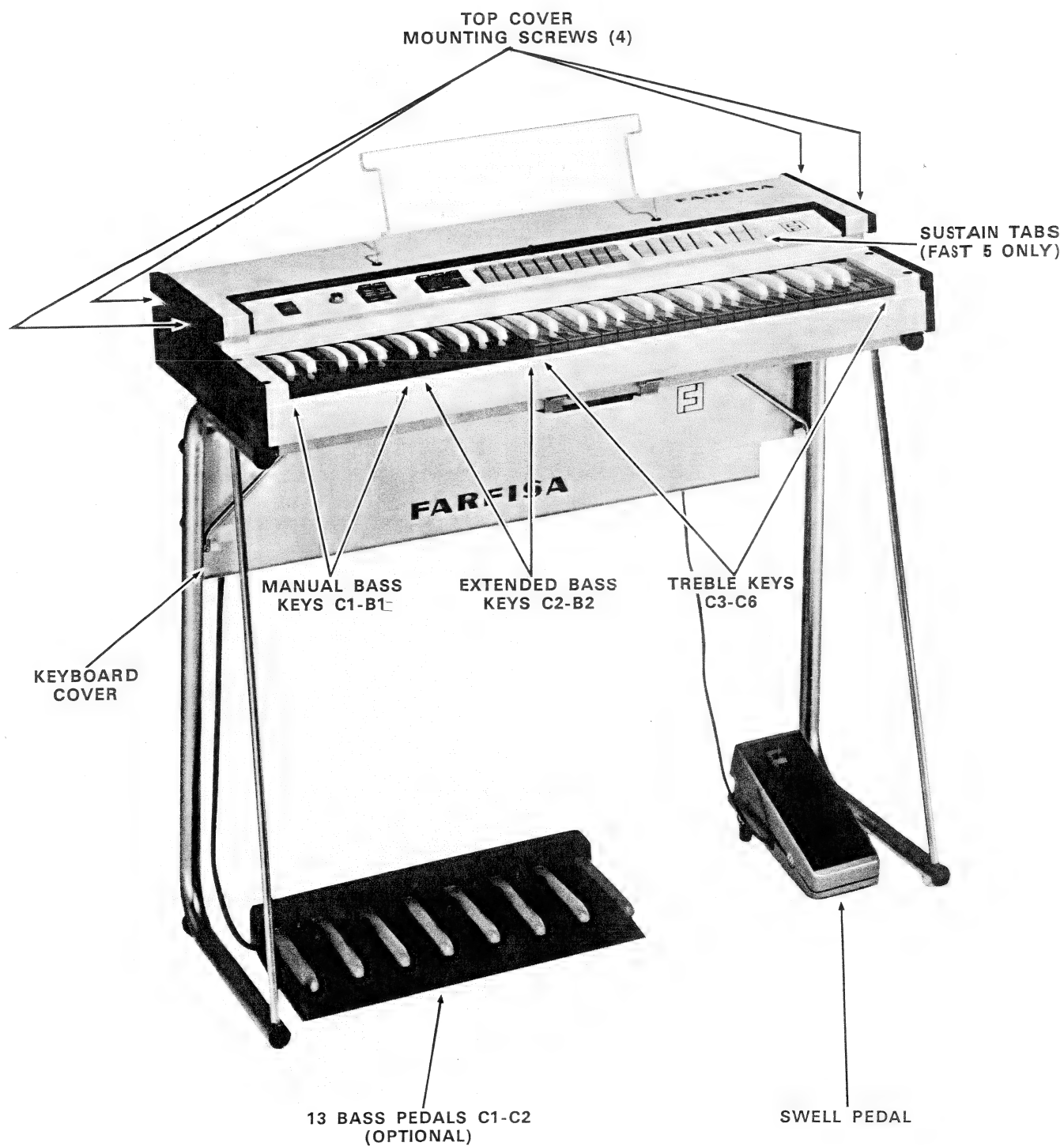
## FAST 4 & 5



FILTERS, PREAMPS,  
PERCUSSION &  
SUSTAIN  
C4/153 & C5/163

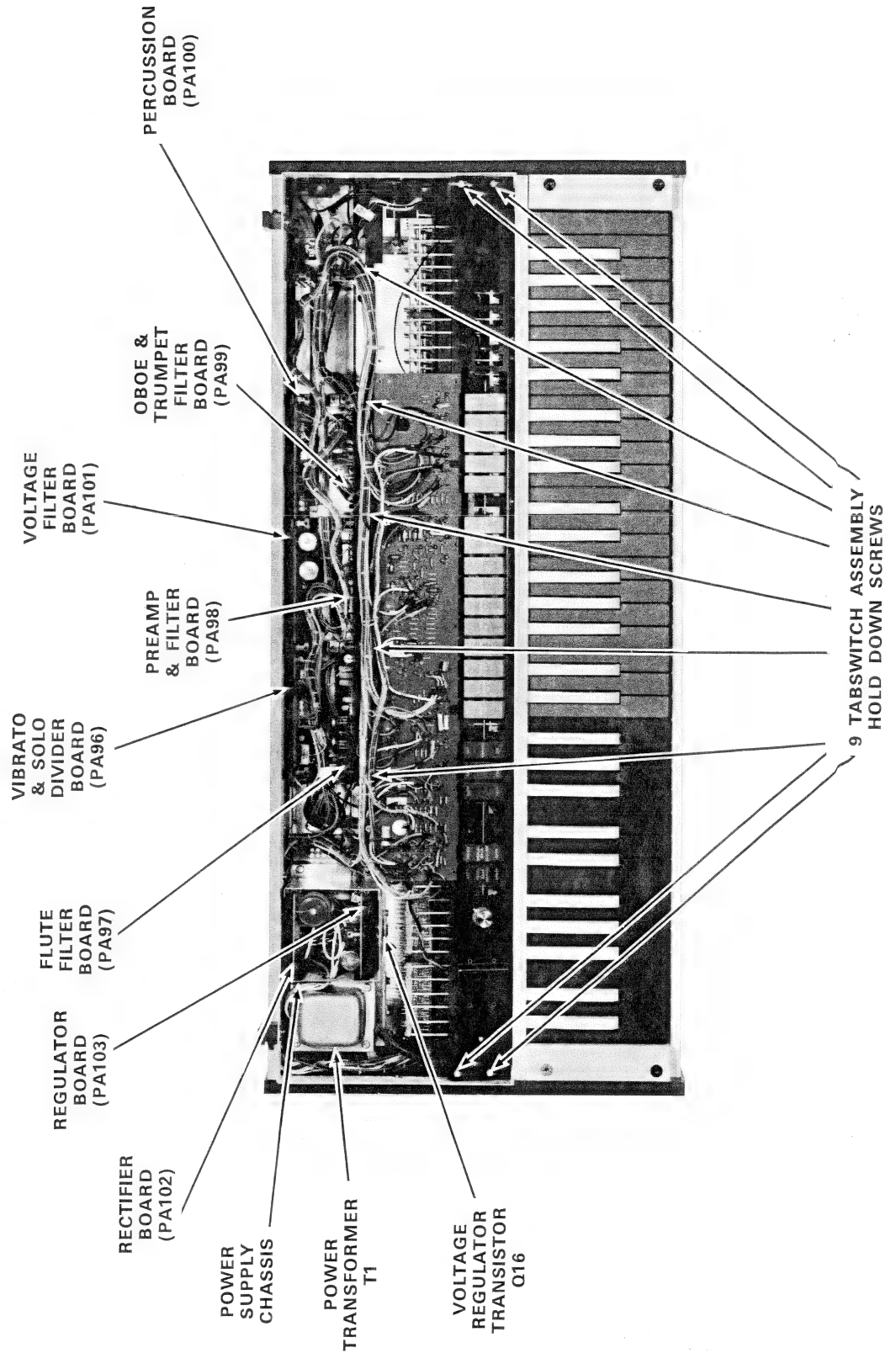
## FAST 4 & 5

### FRONT VIEW FAST 4 & 5



# FAST 4 & 5

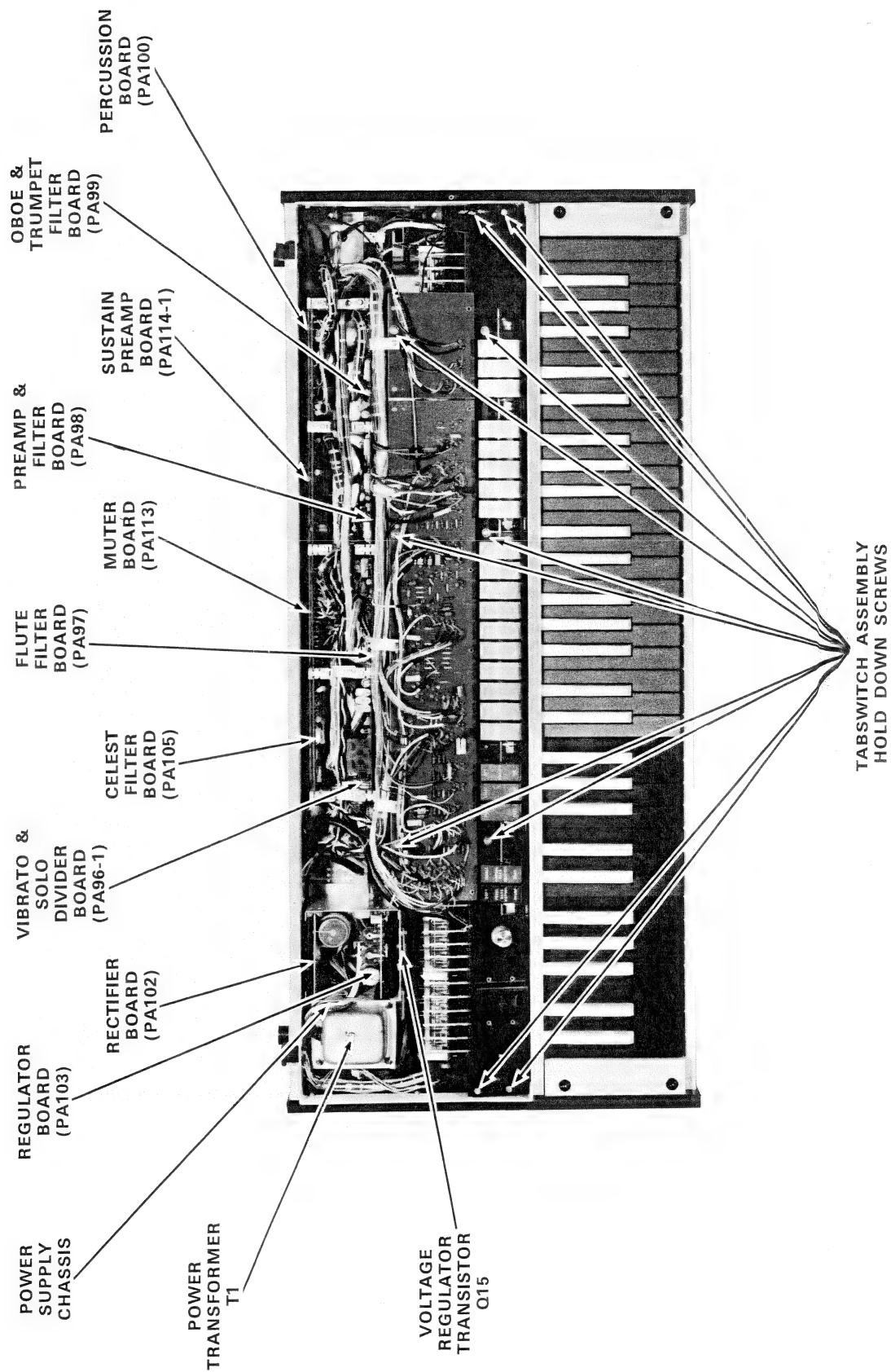
## TOP VIEW FAST 4 (With Cover Removed)





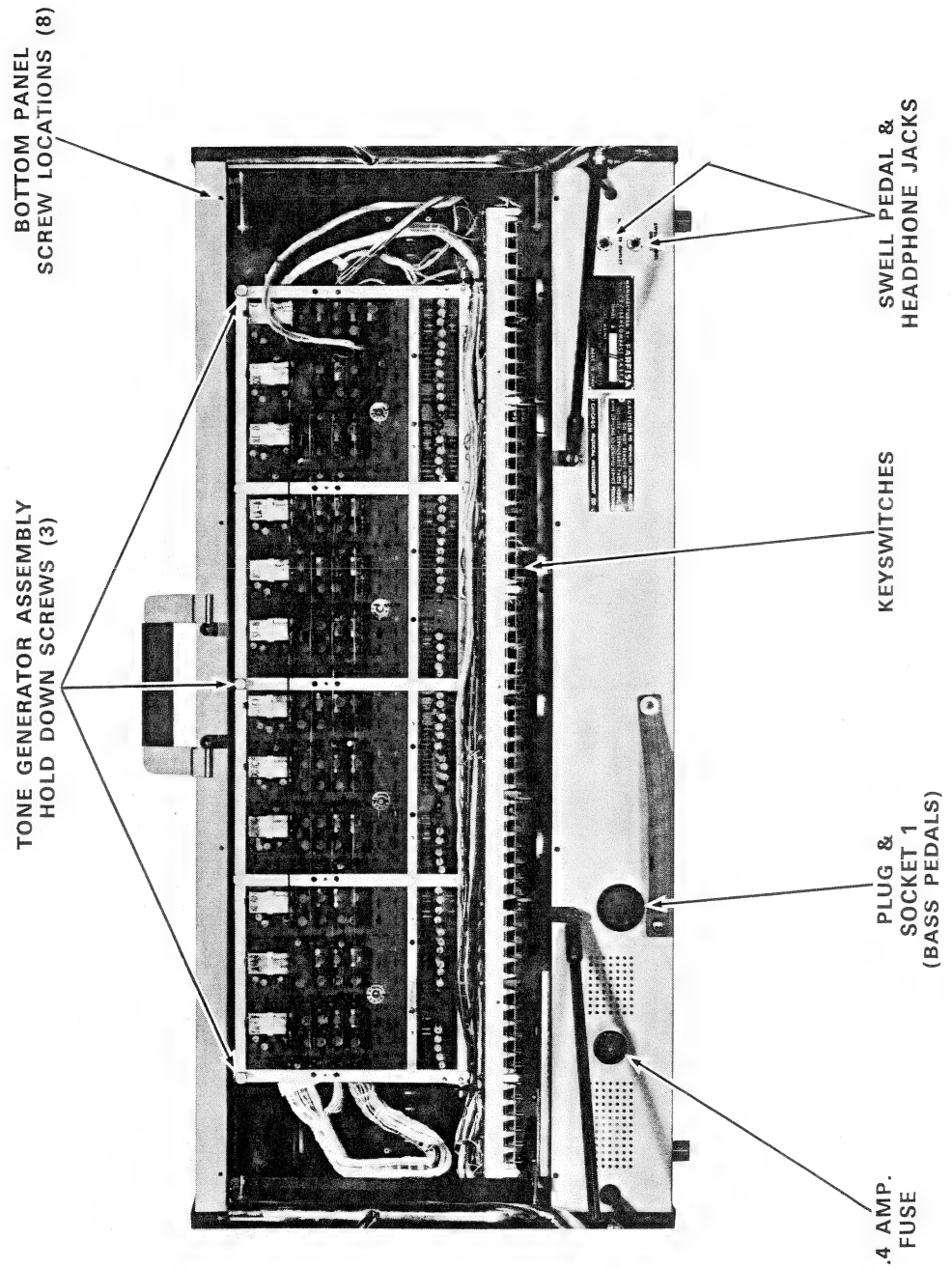
# FAST 4 & 5

## TOP VIEW FAST 5 (With Cover Removed)



# FAST 4 & 5

## BOTTOM VIEW FAST 4 & 5 (With Bottom Panel Removed) (Fast 5 Shown)



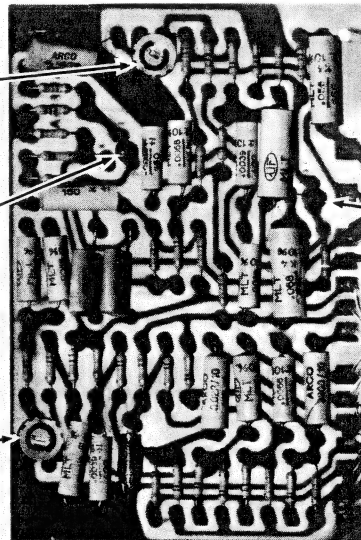


## CELEST FILTER BOARD (PA-105 FAST 5 ONLY)

CELEST  
FILTER #2  
ADJ.  
VR13

CELEST  
FILTER #2  
TRANSISTOR  
Q39

CELEST  
FILTER #1  
ADJ.  
VR 12



+12V  
TERMINAL

CELEST  
FILTER #1  
TRANSISTOR  
Q38

## VIBRATO & SOLO BOARD (PA96 FAST 4) (PA96-1 FAST 5)

VIBRATO  
OSCILLATOR  
TRANSISTOR  
Q12

16' SOLO  
PREAMP  
TRANSISTOR  
Q42  
(FAST 5 ONLY)

16' SOLO  
DIVIDER  
TRANSISTORS  
Q18 Q17

PEDAL SOLO  
DIVIDER  
TRANSISTOR  
Q20

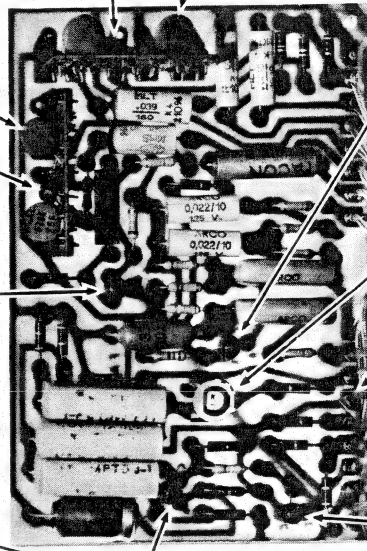
PEDAL SOLO  
DIVIDER  
TRANSISTOR  
Q19

BASS PREAMP  
TRANSISTOR  
Q21

VIBRATO SPEED  
ADJ. VR1

D(+12V)  
TERMINAL

VIBRATO  
EMITTER  
FOLLOWER  
TRANSISTOR  
Q13



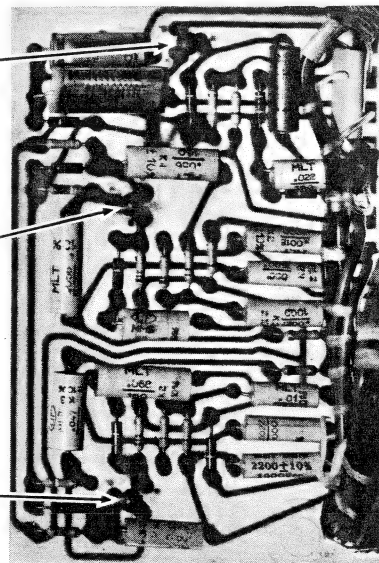
## FAST 4 & 5

### OBOE & TRUMPET FILTER BOARD (FAST 4 & 5 PA99)

OUTPUT  
PREAMP  
TRANSISTOR  
Q37

OBOE  
FILTER  
TRANSISTOR  
Q29

TRUMPET  
FILTER  
TRANSISTOR  
Q28



+12V.  
TERMINAL

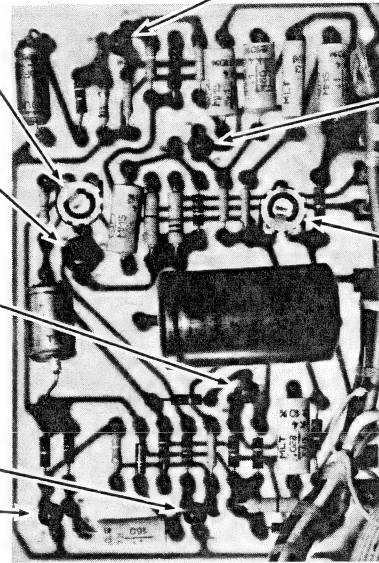
### PERCUSSION BOARD (FAST 4 & 5 PA100)

1 SHOT  
MULTIVIBRATOR  
TRANSISTORS  
Q32 Q33

PERCUSSION  
PULSE  
DETECTOR  
TRANSISTOR  
Q31

DRIVER  
TRANSISTOR  
Q34

PERCUSSION  
ATTACK  
ADJ.  
VR11



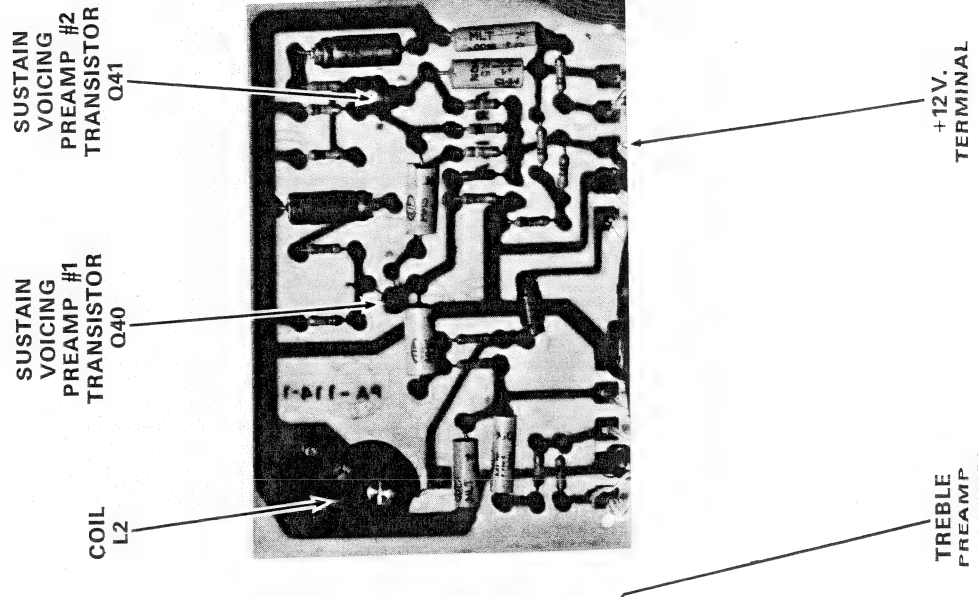
PERCUSSION  
LENGTH  
ADJ.  
VR10

PERCUSSION  
KEYER  
TRANSISTOR  
Q35

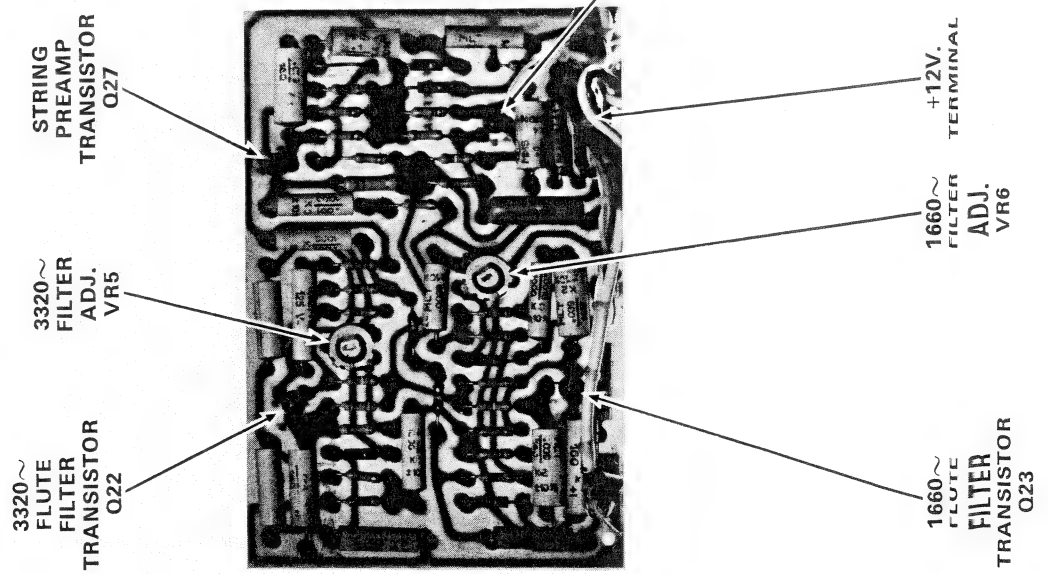
PERCUSSION  
PREAMP  
TRANSISTOR  
Q36

+12V.  
TERMINAL

## SUSTAIN PREAMP BOARD (PA114-1 FAST 5 ONLY)

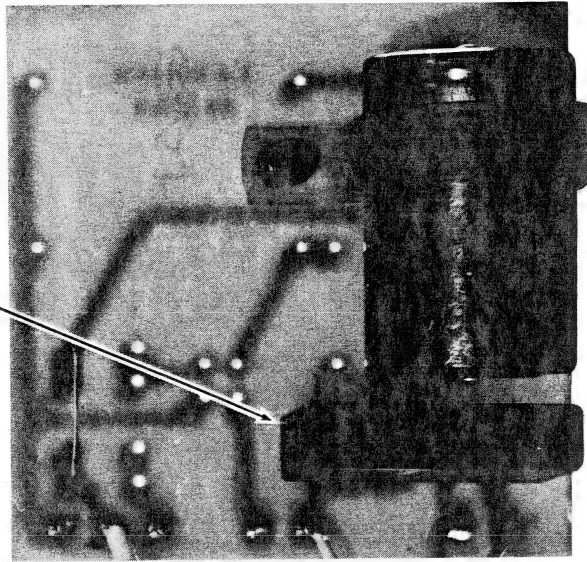


## PREAMP & FILTER BOARD (FAST 4 & 5 PA98)



## RECTIFIER BOARD FAST 4 & 5 (PA102)

DIODES  
D3-D6

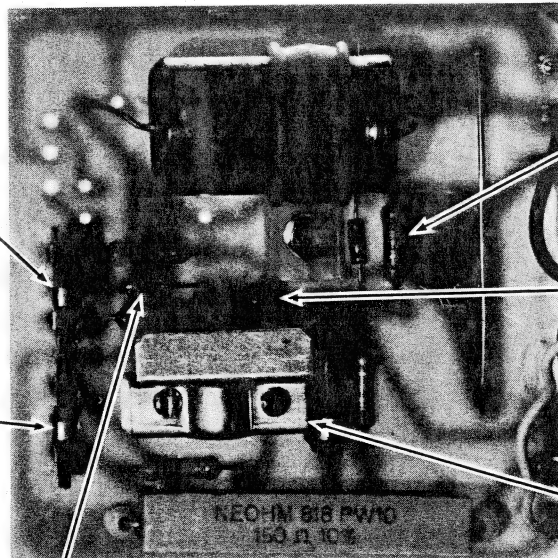


## REGULATOR BOARD FAST 4 & 5 (PA103)

VOLTAGE  
ADJ.  
VR2

STABILITY  
ADJ.  
VR3

DIODE D5

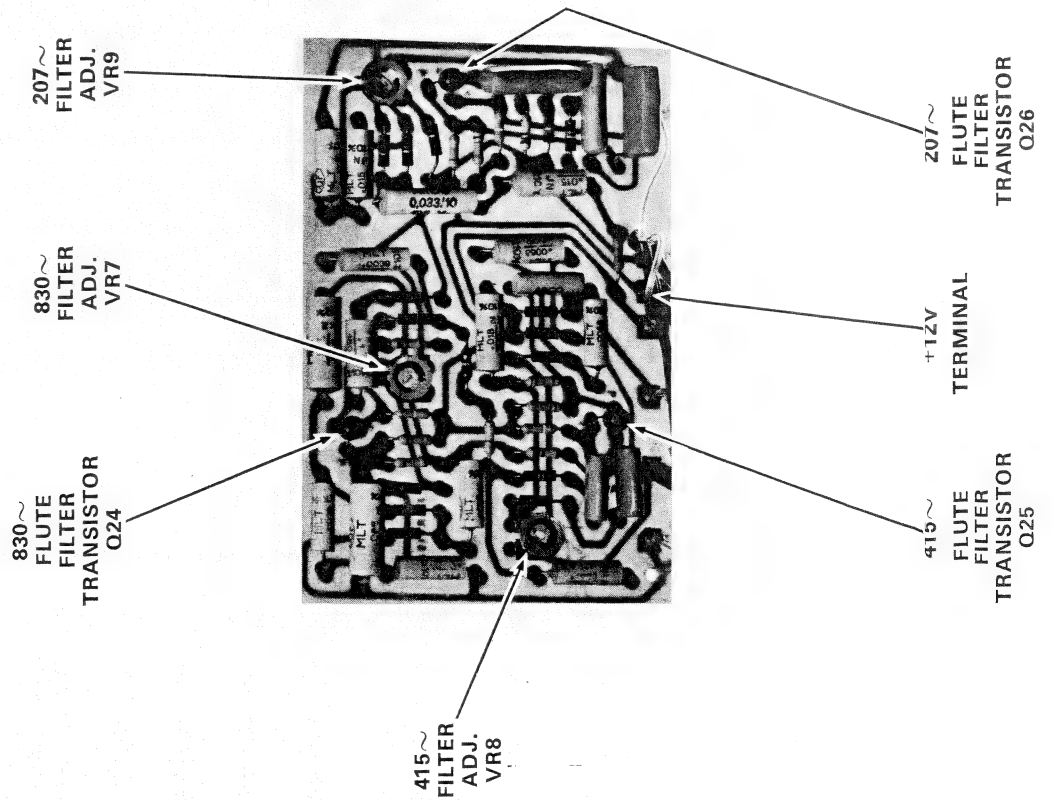


ZENER  
DIODE Z1

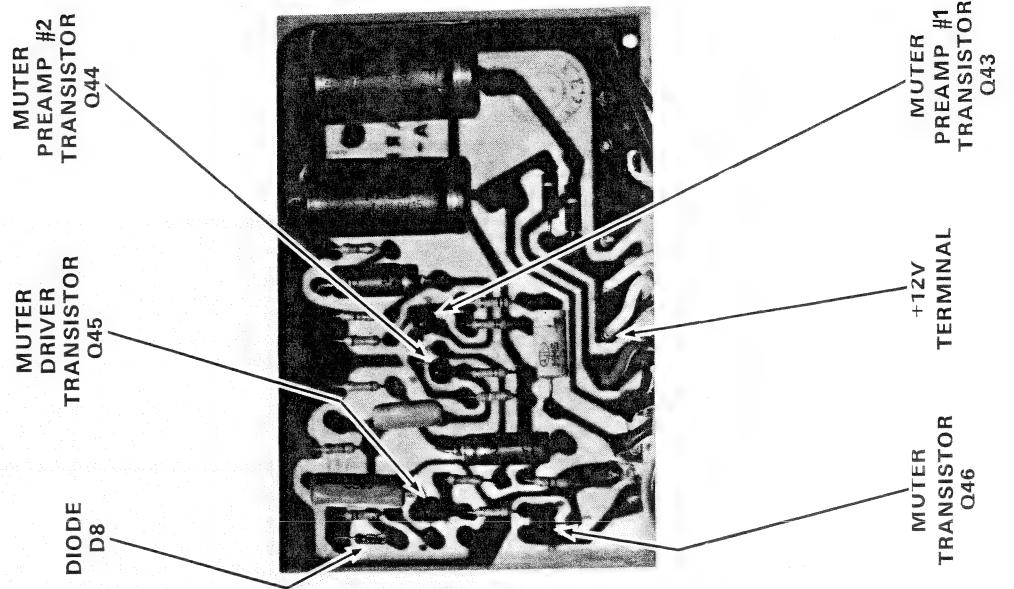
VOLTAGE  
SENSOR  
TRANSISTOR  
Q14

VOLTAGE  
REGULATOR  
TRANSISTOR  
Q19

## FLUTE FILTER BOARD FAST 4 & 5 (PA97)

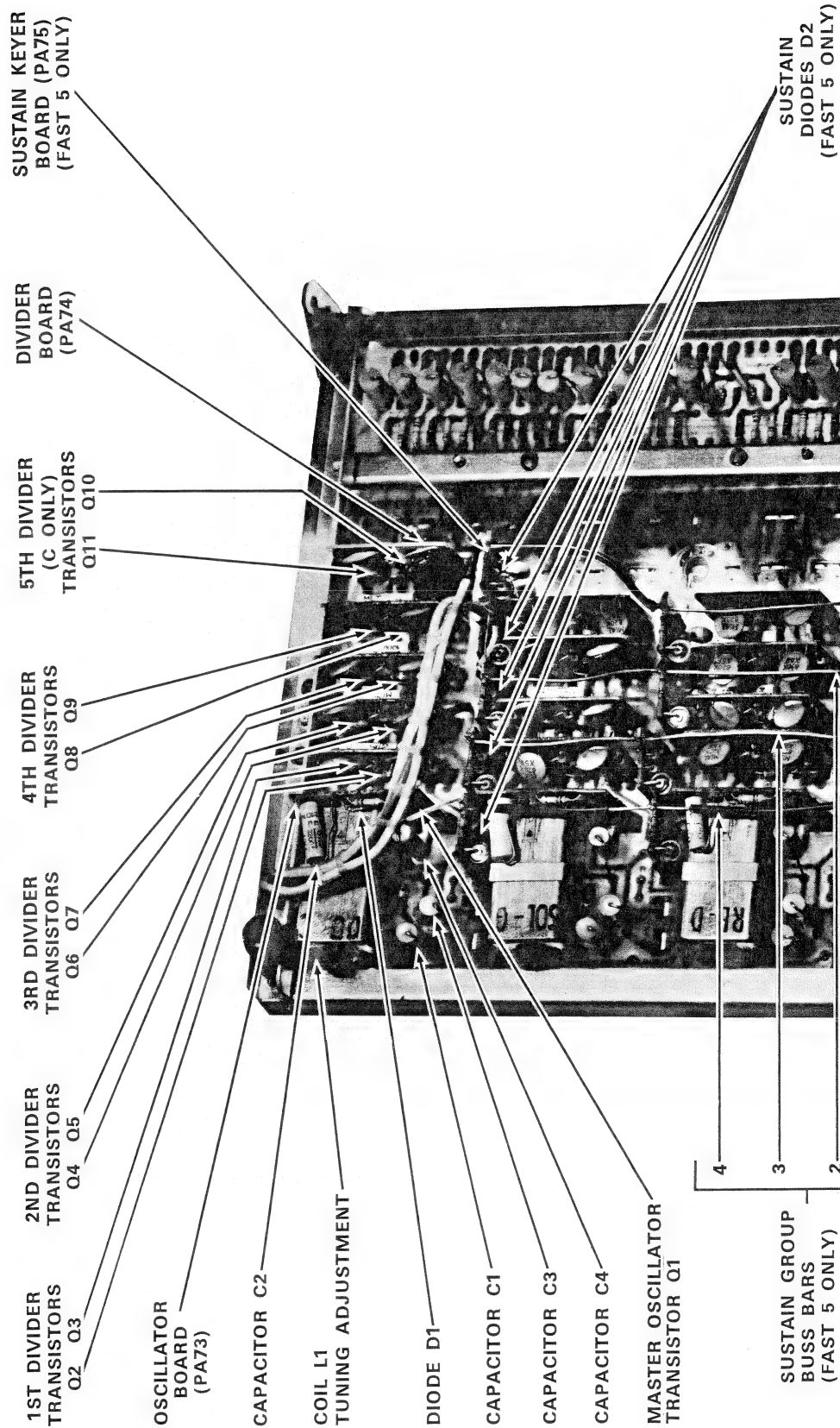


## MUTER BOARD (PA-113 FAST 5 ONLY)





## **TONE GENERATOR BOARD** (With Oscillator, Divider & Sustain Keyer Boards) FAST 4 & 5 (PA76)



# PROFESSIONAL

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# PROFESSIONAL

## SPECIFICATIONS

### MAIN FEATURES

61 Notes Keyboard—C to C  
Phonic extension: 32.7 cycles to 7,902 cycles

Swell Pedal

#### Flute Section

8 Voice Stops: 16' - 8' - 5-1/3'  
4' - 2-2/3' - 2' - 1-3/5' - 1-1/3'

Cancel Tab

Independent Volume Control

Independent Vibrato Control

#### Clarinet-Sharp Section

4 Clarinet Voice Stops: 16' - 8' - 5-1/3' - 4'  
4 Sharp Voice Stops: 2-2/3' - 2' - 1-3/5' - 1-1/3'

Cancel Tab

Independent Volume Control

Independent Vibrato Control

#### Percussion Section

8 Stops: 16' - 8' - 5-1/3' - 4' - 2-2/3' - 2' - 1-3/5' - 1-1/3'

Percussion length control: Short - Medium - Long

Cancel Tab operating on the 3 lowest octaves

Cancel Tab operating on the 2 highest octaves

2-position tab for Percussion with synchronized  
repetition or for Percussion according to the  
Phrasing.

Independent Volume Control

#### Sustain Section

3 Stops: Celesta - Harpsichord - Kinura

2-position Sustain length control tab

Cancel Tab operating on the 3 lowest octaves

Independent Volume Control

Independent Vibrato Control

#### Vibrato Section

3 Stops: On/Off - Slow/Fast - Light/Heavy

Overall Output Volume Control

Output for Stereo Headset

Tilting Keyboard

On/Off switch and Pilot lamp

Folding legs

Elegant carrying bag

Voltage: 115 Volt AC, 60 cycles

Dimensions when in use: 38" x 18 3/4" x 36"

Dimensions of the instrument closed:

40" x 10" x 20"

Weight: 67 lbs.

# PROFESSIONAL

## ADJUSTMENTS PROFESSIONAL

### VR1-VR11 FILTERS

These adjustments are carefully set at the factory! Readjustment should not be necessary unless Filter components are replaced. To adjust a filter: First, connect an A.C. voltmeter across the speakers in the amplifier to which the organ is connected. Then, with a clip lead, ground the transistor collector lead of the filter requiring adjustment. While the filter is grounded and using only one flute tabswitch at a time, locate a group of dead keys on the keyboard and hold down one key at or near the center of this group. Next, while holding the note, remove the clip lead from the filter transistor. Now with the note playing, adjust the A.C. meter range so that the meter needle reads near center scale. (Use any meter range and organ volume combination that is convenient). With the note still playing, set the filter adjustment to a point that gives the maximum increase in A.C. voltage.

### VR12-VR13 VIBRATO DEPTH & LEVEL

These two adjustments affect each other. Adjustment of one will change the other. Proper adjustment is achieved when the vibrato functions clearly. Extreme setting of either the depth or level adjustments will result in **no vibrato**. Always try adjusting vibrato before servicing the vibrato circuits.

### VR14-VR15 PERCUSSION LENGTH & ATTACK

These two adjustments affect each other. Adjustment of one will change the other. Proper adjustment is achieved when the percussion functions with the least amount of key pop; and with a distinct difference in percussion length between short and long percussion tabswitch settings. Extreme setting of either the length or attack adjustments will result in **no percussion**. Always try adjusting percussion before servicing the percussion circuits.

### VR16 SQUELCH

The function of this adjustment is to compensate for tolerances in Squelch Keyer transistors. Since this adjustment is carefully set at the factory, adjustment should only be necessary when squelch circuit components are replaced. Proper setting is achieved when this adjustment is at or near center and the organ plays with ample volume range.

### VR17 ORGAN LEVEL

Set this adjustment according to customer preference! A normal setting is approximately three-fourths toward full volume.

### VR22 +12 VOLTAGE

This adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. To adjust, connect

a D.C. voltmeter to plug and socket #1 pin 3, then set the adjustment so that the meter reads +12 volts. Improper voltage adjustment will result in unstable tone generator operation. Always check the +12 volt supply voltage before servicing tone generators.

### VR23 STABILITY

The stability adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. This adjustment has a wide range of normal operation. Only extreme settings on this adjustment will result in unstable Power Supply operation.

### VR24 +6 VOLTAGE

This adjustment is carefully set at the factory! Readjustment should not be necessary unless Power Supply components are replaced. To adjust, connect a D.C. voltmeter to plug and socket #1 pin 5, then set the adjustment so that the meter reads +6 volts. +6V is used for audio ground. Low or missing +6V will result in hum and increased sound leakage. Always check the +6 volt supply voltage before servicing.

### L1 TUNING

The 12 Tone Generator Master Oscillator circuits determine the pitch of the entire organ. Adjusting any one of the Master Oscillator tuning adjustments will tune all the notes of that tone generator. Tuning any group of 12 notes automatically tunes the entire organ.

Tuning may be accomplished by using a small non-conductive screwdriver and one of the following methods:

1. Set of 12 Tuning Forks: Zero beat the note of the organ to be tuned to the sound of the corresponding tuning fork. This is a highly accurate method for tuning.
2. Strobe Conn or Strobe Tuner: This is done by visual observation of a strob pattern. Simply follow directions supplied with the Strobe tuner. This is a highly accurate tuning method.
3. Another instrument: Zero beat the note of the organ to be tuned to the sound of a corresponding note on an "in tune" instrument (piano, organ, accordion, etc.). Accuracy is dependent upon the tuning of the other instruments. This method is especially desirable when the other instrument is to be played with the organ.
4. One Tuning Fork: One tuning fork is used to set the "temperment" (one note). The other 11 notes are set by ear using the number of beats between "4ths" and "5ths." This requires a trained ear. Accuracy is dependent upon the tune.

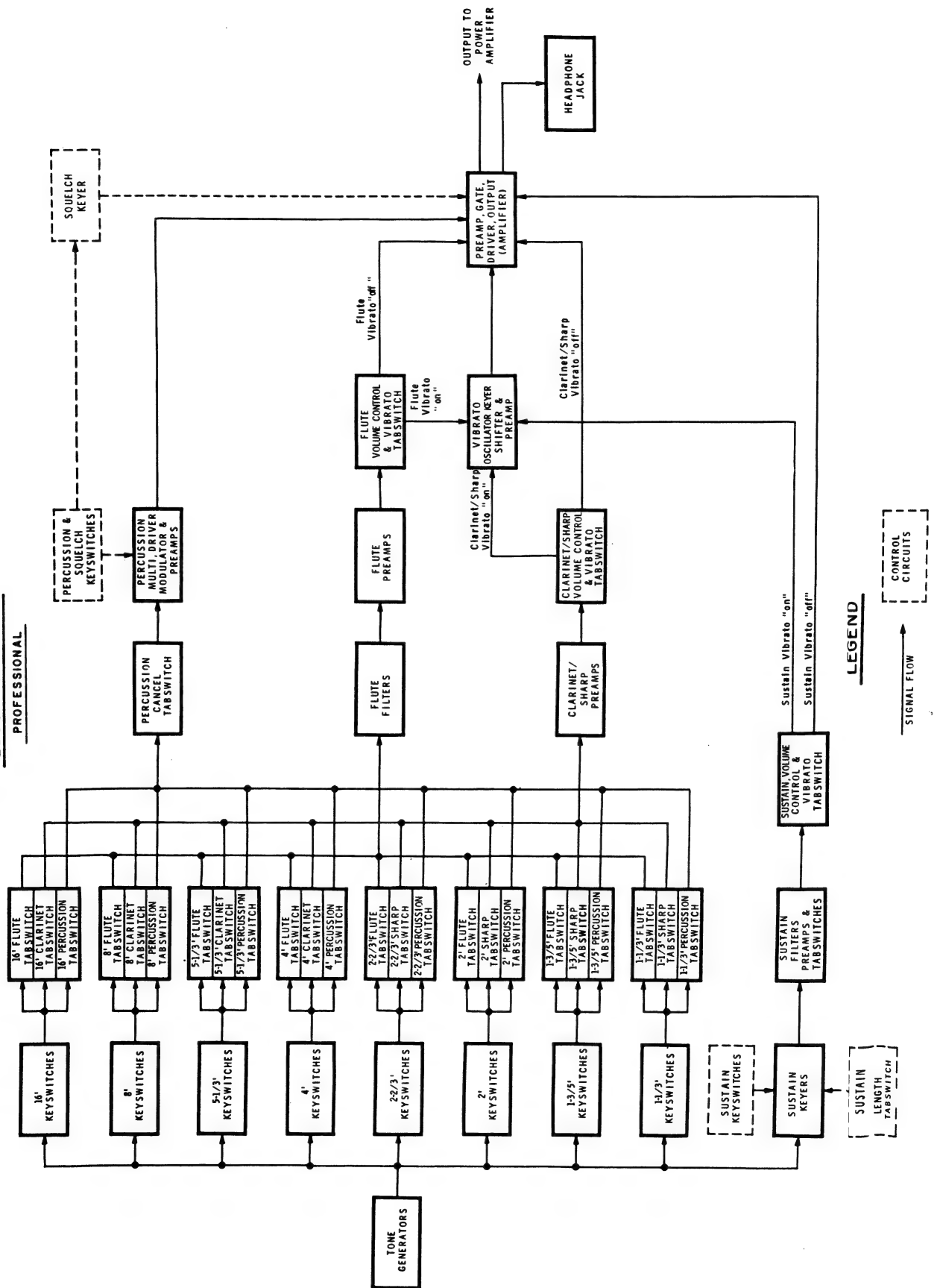
# PROFESSIONAL

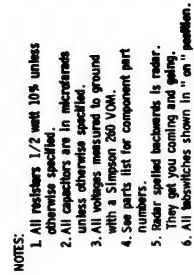
## TRANSISTOR VOLTAGES

Q No.	Circuit	Collector or Drain	Emitter or Source	Base or Gate
Q1	Master Oscillator	+2.2	+12	+14
Q2-Q3	1st Divider	+6	+1.3	+1.5
Q4-Q5	2nd Divider	+6	+1.3	+1.5
Q6-Q7	3rd Divider	+6	+1.3	+1.5
Q8-Q9	4th Divider	+6	+1.3	+1.5
Q10-Q11	5th Divider	+6	+1.3	+1.5
Q12-Q13	6th Divider	+6	+1.3	+1.5
Q14	16' Solo Divider	+10	+1.1	+1
Q15	16' Solo Divider	+1.3	+1.1	+1.8
Q16	Clarinet/Sharp Preamp	+3.8	+7	+4
Q17	Clarinet/Sharp Preamp	+4.5	+3.1	+3.8
Q18	103~Flute Filter	+4.9	+7	+1
Q19	206~Flute Filter	+4.9	+7	+1
Q20	412~Flute Filter	+4.9	+7	+1
Q21	824~Flute Filter	+4.9	+7	+1
Q22	1648~Flute Filter	+4.9	+7	+1
Q23	3296~Flute Filter	+4.9	+7	+1
Q24	6592~Flute Filter	+5.4	+7	+6
Q25	Flute Preamp	+3.5	+9	+1
Q26	206~Celeste Filter	+5.5	+5	+5
Q27	412~Celeste Filter	+5	+5	+5
Q28	824~Celeste Filter	+5.2	+5	+5
Q29	1648~Celeste Filter	+5.5	+5	+5
Q30	Celeste/Kinura Preamp	+4.9	+6	+9
Q31	Percussion Multivibrator	+3	φ	+7
Q32	Percussion Multivibrator	+12	φ	φ
Q33	Percussion Driver	φ	+9	+12
Q34	Percussion Modulator	+9	φ	+9
Q35	Percussion Preamp	+3.5	+5	+4
Q36	Percussion Preamp	+6	+3	+3.5
Q37	Vibrato Oscillator	+5	+1.7	+1.5
Q38	Vibrato Phase Shifter	+9	+5	+7
Q39	Vibrato Phase Keyer	+9	+9	+2.8
Q40	Vibrato Output Preamp	+5		+3
Q41	Squelch Keyer	φ	+11	+8.8
Q42	Amp Input Preamp	+7	+1	+1.2
Q43	Squelch Gate	+1.3	+4	+1.5
Q44	Driver	+4.2	+7	+1.3
Q45	Output	φ	+5	+4.2
Q46	Output	+12	+5.5	+6
Q47	Voltage Sensor	-12	+5.8	+5.2
Q48	Voltage Regulator	φ	-12.5	-12.5
Q49	Voltage Regulator	φ	+12	+12

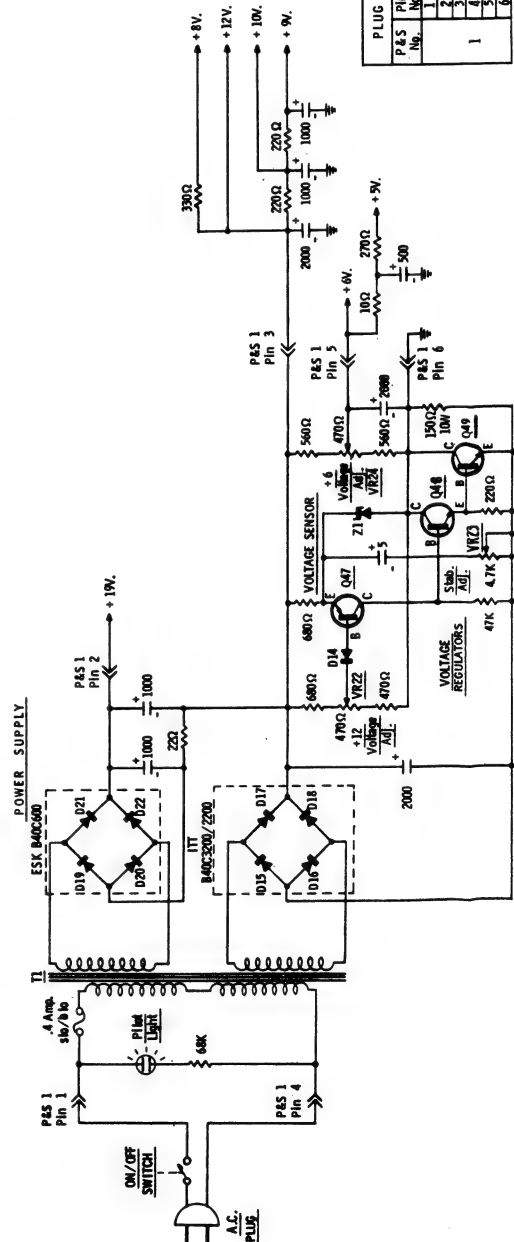
# PROFESSIONAL

**BLOCK DIAGRAM**  
PROFESSIONAL

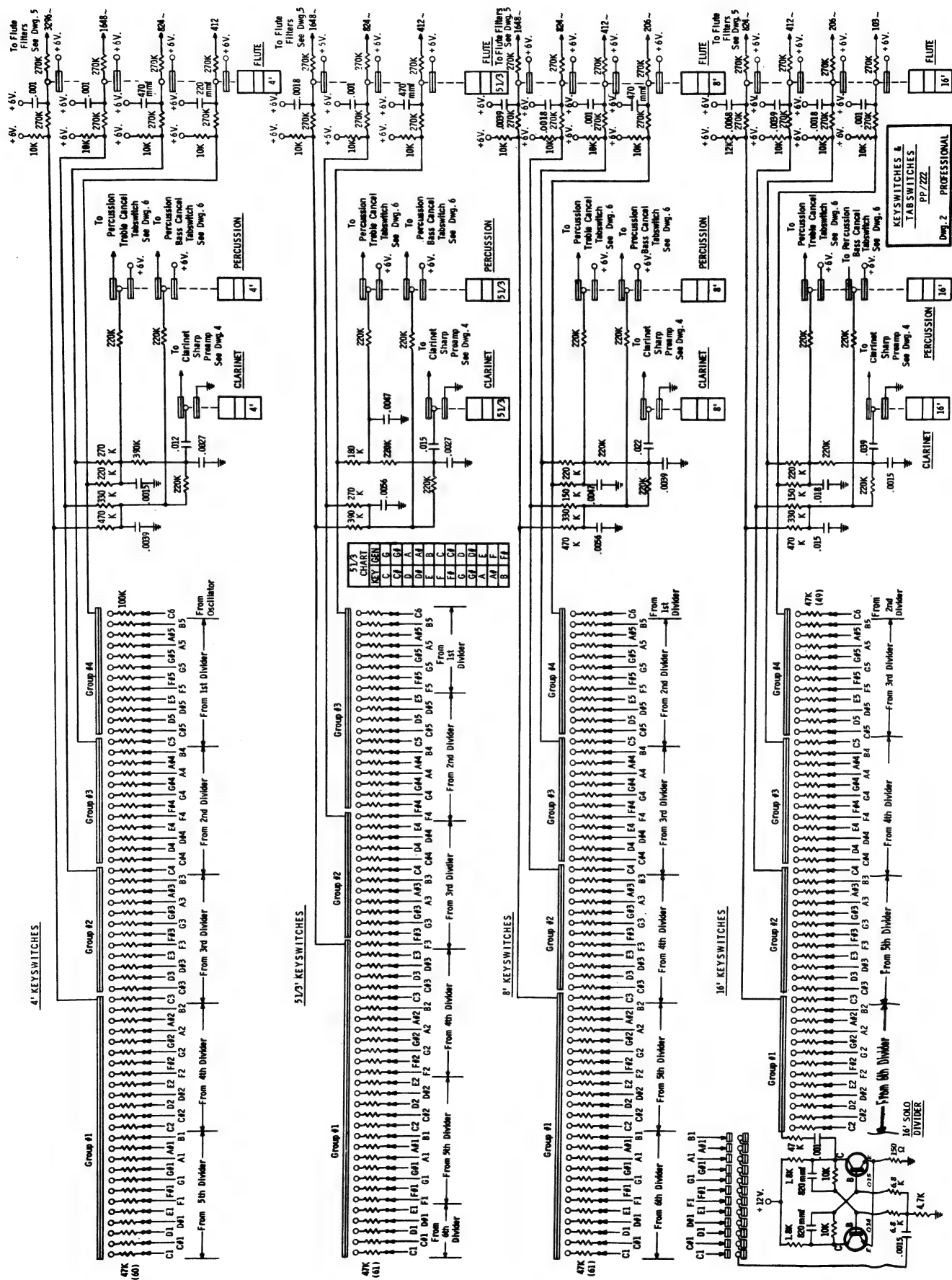




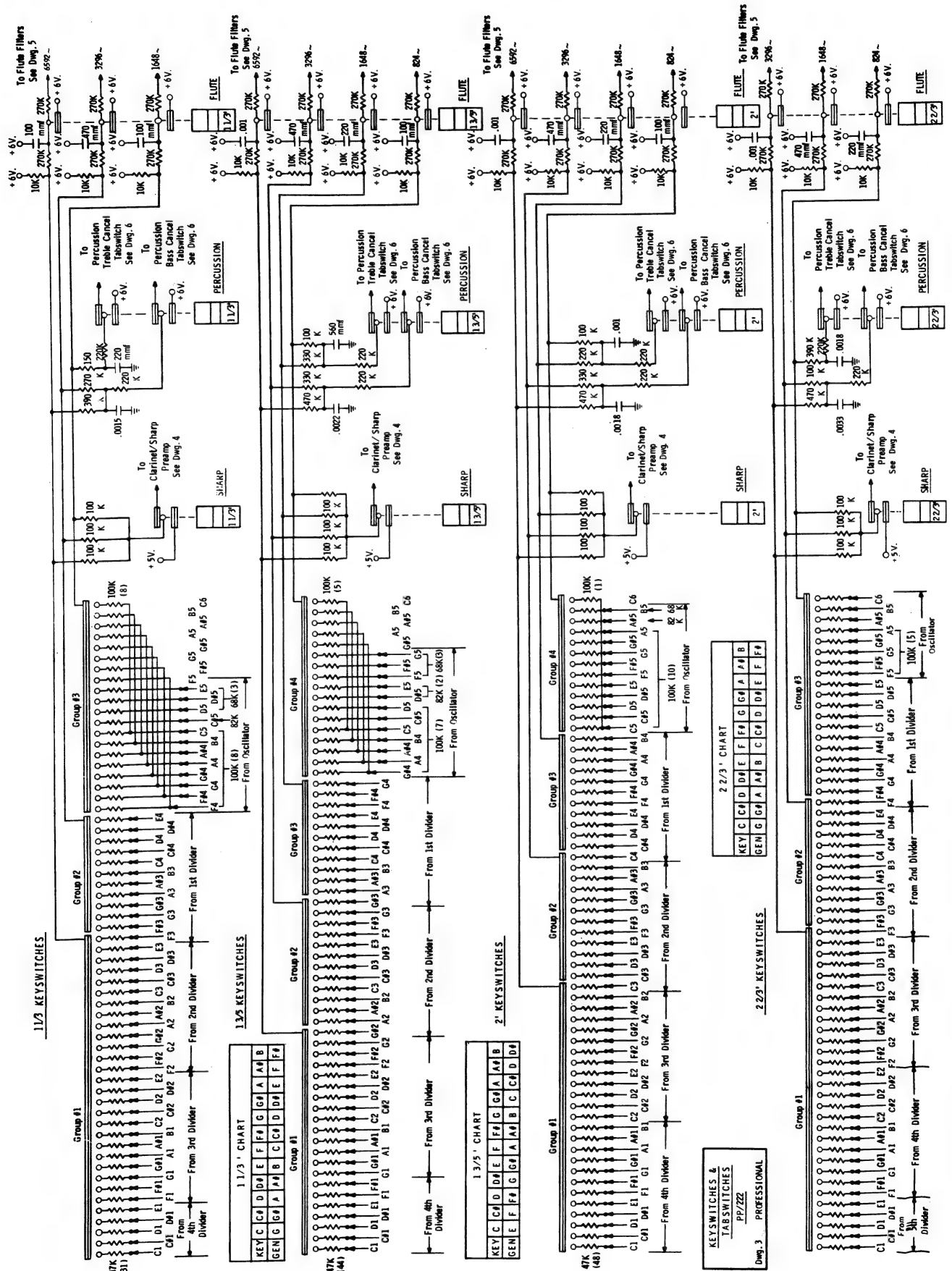
PLUG & SOCKET CONNECTIONS		
P & S No.	Pin No.	Voltage Information
1	1	117 VAC Line Voltage
	2	+19V. Sustain Short B+
	3	+12V. Beam B+
	4	117 VAC Line Voltage
	5	+5V. Audio Ground
	6	0V. Ground



# PROFESSIONAL



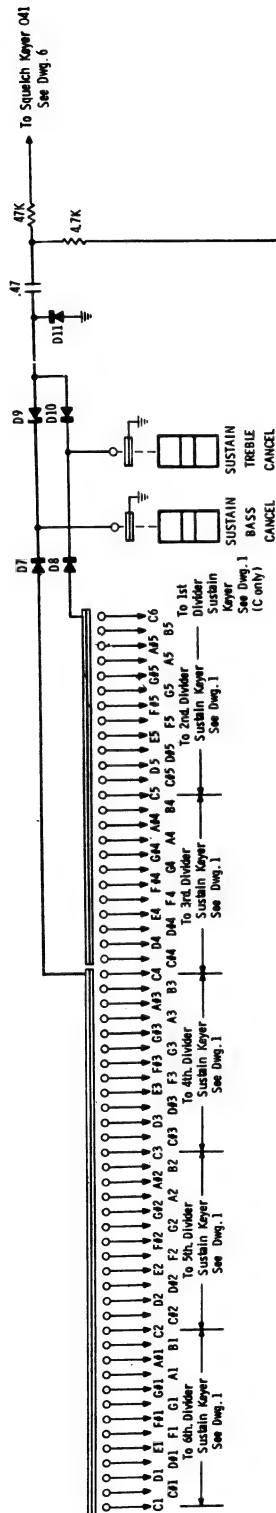
# PROFESSIONAL



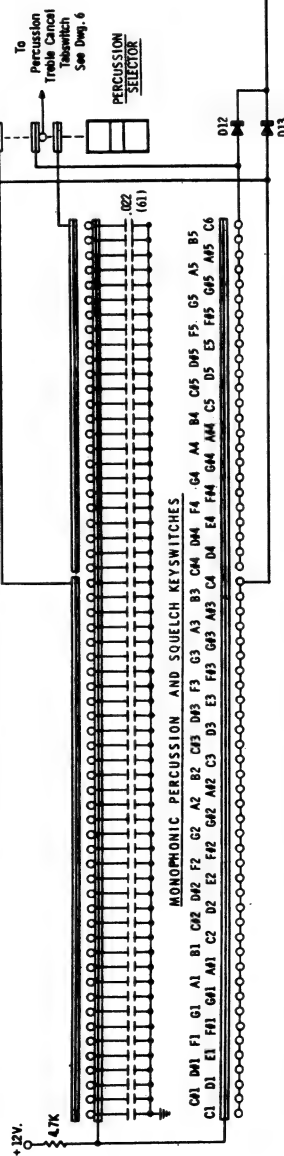


# PROFESSIONAL

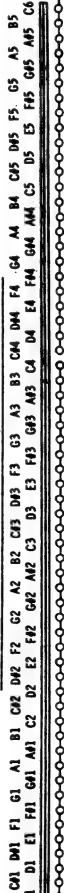
## SUSTAIN KEYSWITCHES



## POLYPHONIC PERCUSSION KEYSWITCHES

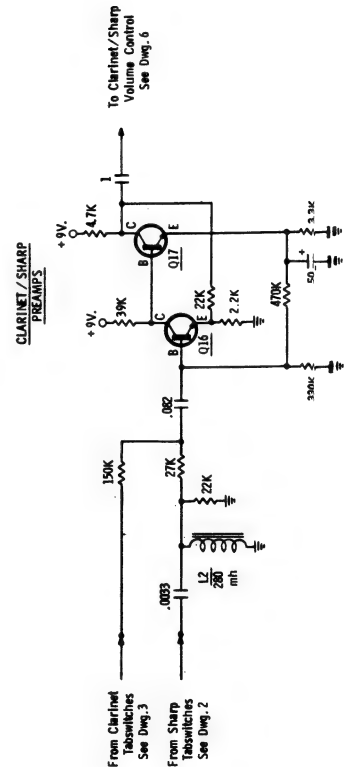


## MONOPHONIC PERCUSSION AND SQUELCH KEYSWITCHES



## NOTES:

1. All resistors 1/2 watt 10 % unless otherwise specified.
2. All capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. Winding's not everything, but leading is just plain nothing!
5. All keyswitches shown in "off" position.
6. See parts list for component part numbers.



SUSTAIN KEYSWITCHES  
PERCUSSION KEYSWITCHES &  
CLARINET/SHARP PREAMP  
PP-7222  
Dwg. No. 4 PROFESSIONAL

# PROFESSIONAL

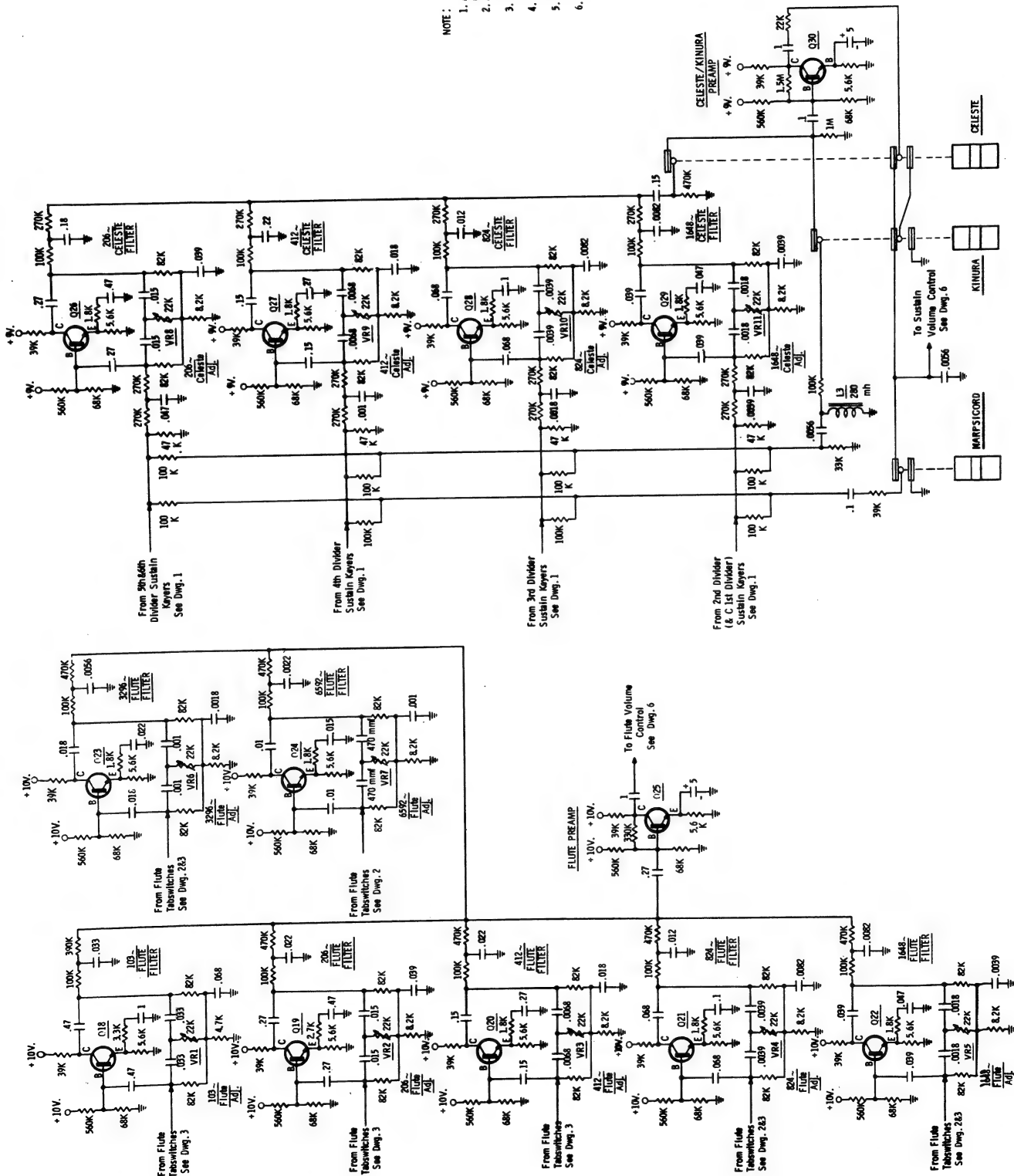
**NOTE :**

1. ALL RESISTORS 1/2 WATT 10% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. ALL VOLTAGES MEASURED TO GROUND WITH A SIMPSON 260 VOM.
4. EPITAPH ON A PESSIMIST'S HEADSTONE: "I EXPECTED THIS, AND HERE I AM."
5. SEE PART'S LIST FOR COMPONENT PART NUMBERS.
6. ALL TABSWITCHES SHOWN IN "ON" POSITION.

**FLUTE FILTERS, CELESTE FILTERS,**

& PREAMPS  
PP/222

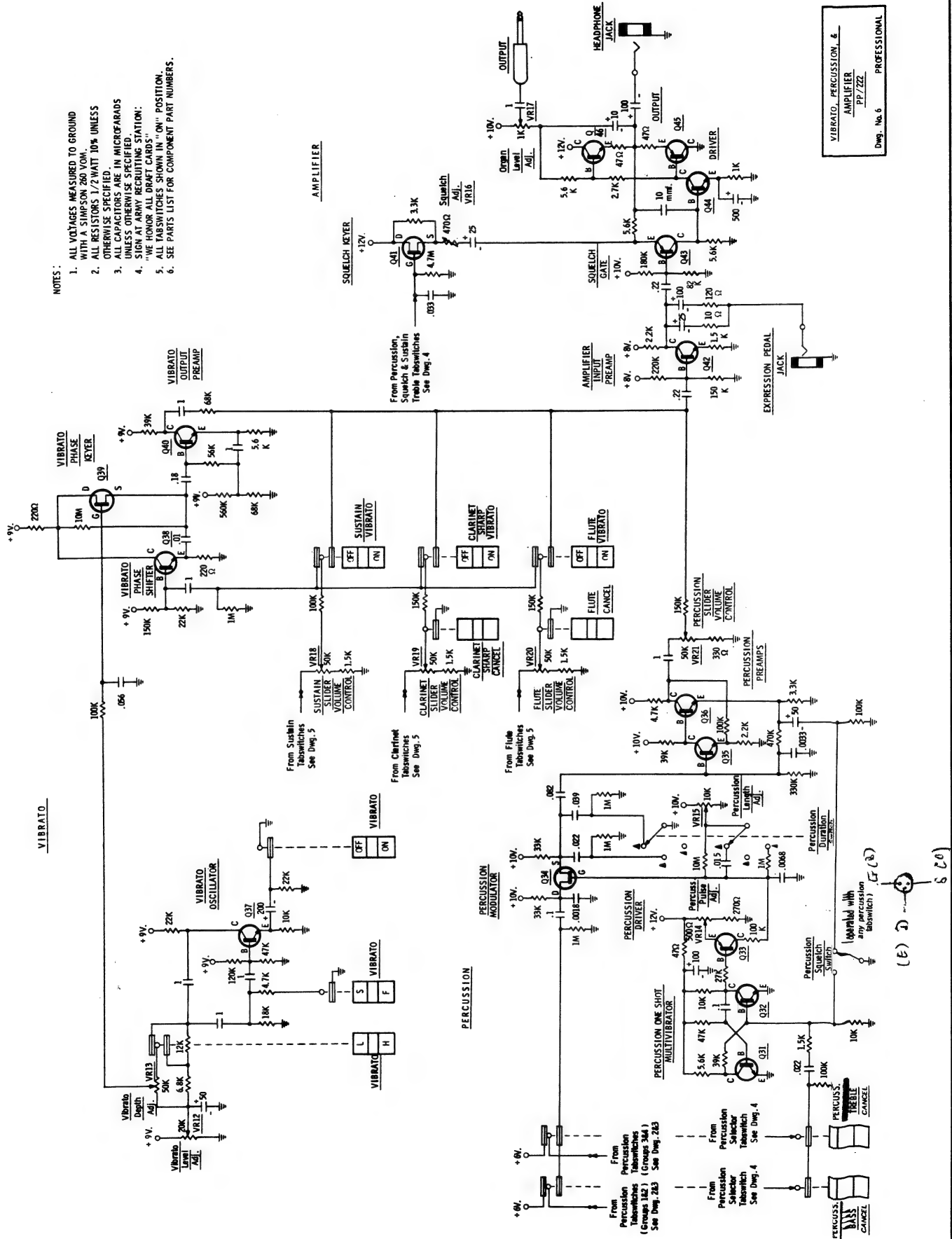
Draw No 5 PROFESSIONAL



# PROFESSIONAL

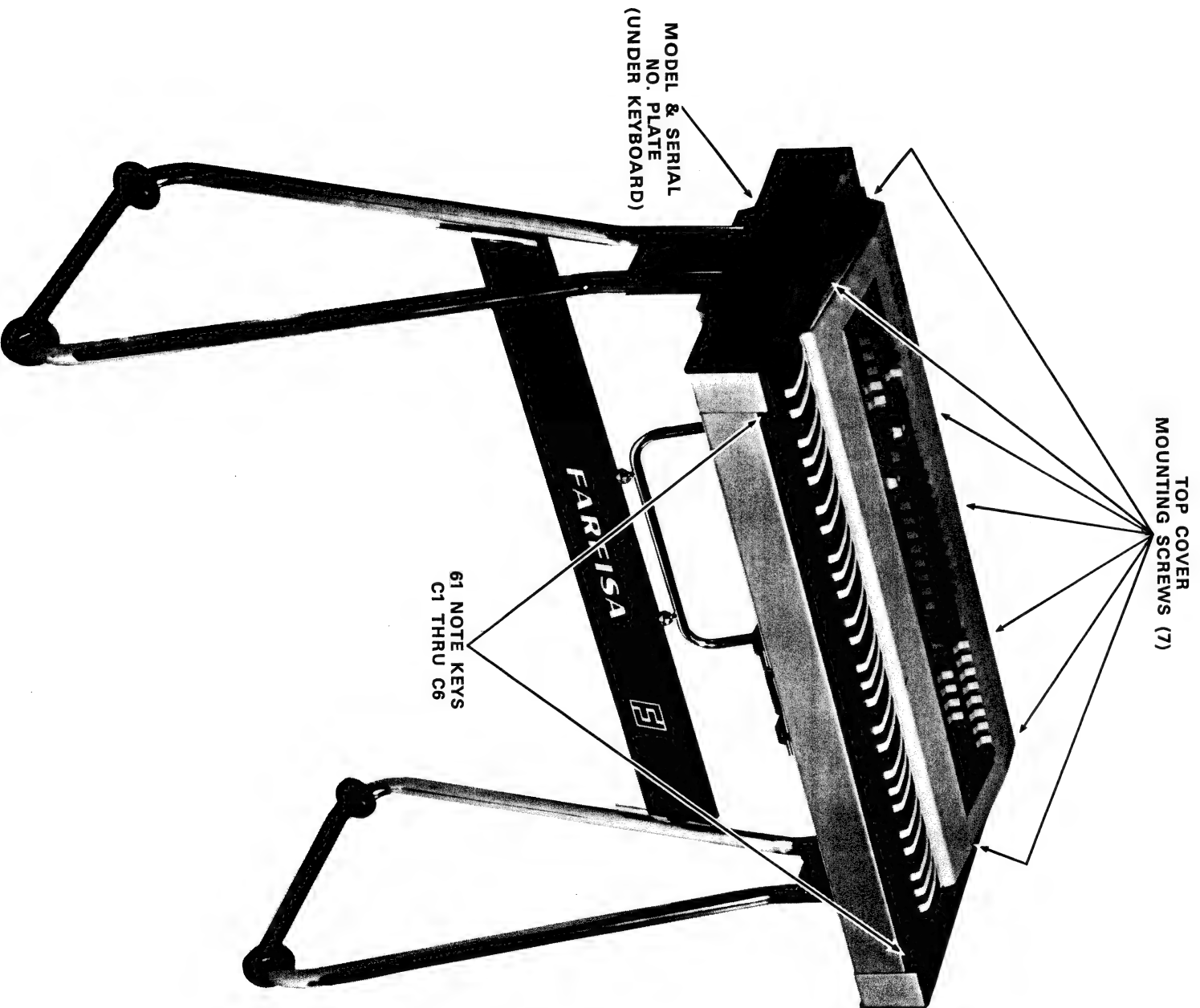
## NOTES:

1. ALL VOLTAGES MEASURED TO GROUND WITH A SIMPSON 260 VOM.
2. ALL RESISTORS 1/2 WATT 10% UNLESS OTHERWISE SPECIFIED.
3. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
4. SIGN AT ARMY RECRUITING STATION: "WE HONOR ALL DRAFT CARDS".
5. ALL TAB SWITCHES SHOWN IN "ON" POSITION.
6. SEE PARTS LIST FOR COMPONENT PART NUMBERS.



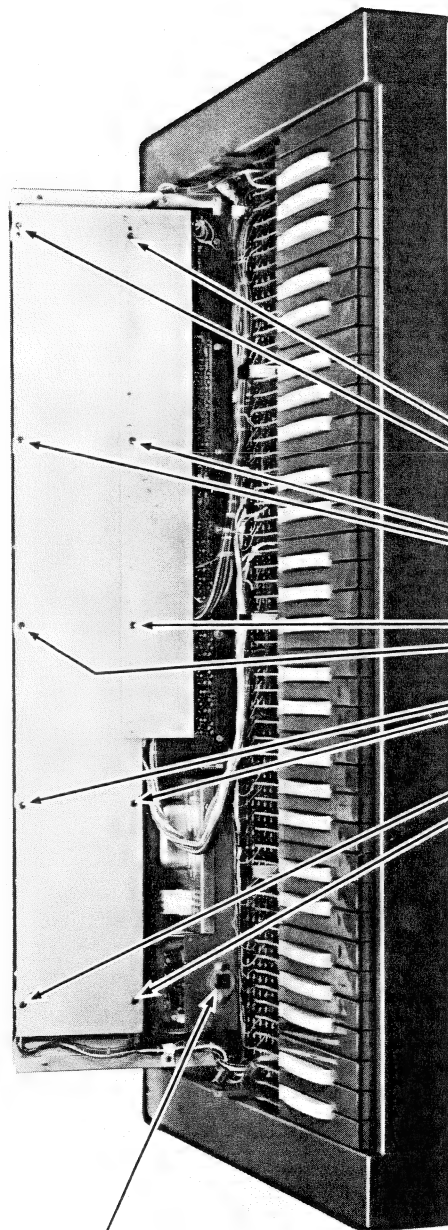
# PROFESSIONAL

## FRONT VIEW PROFESSIONAL



# PROFESSIONAL

## FRONT VIEW PROFESSIONAL (Tabswitch Assembly Raised)

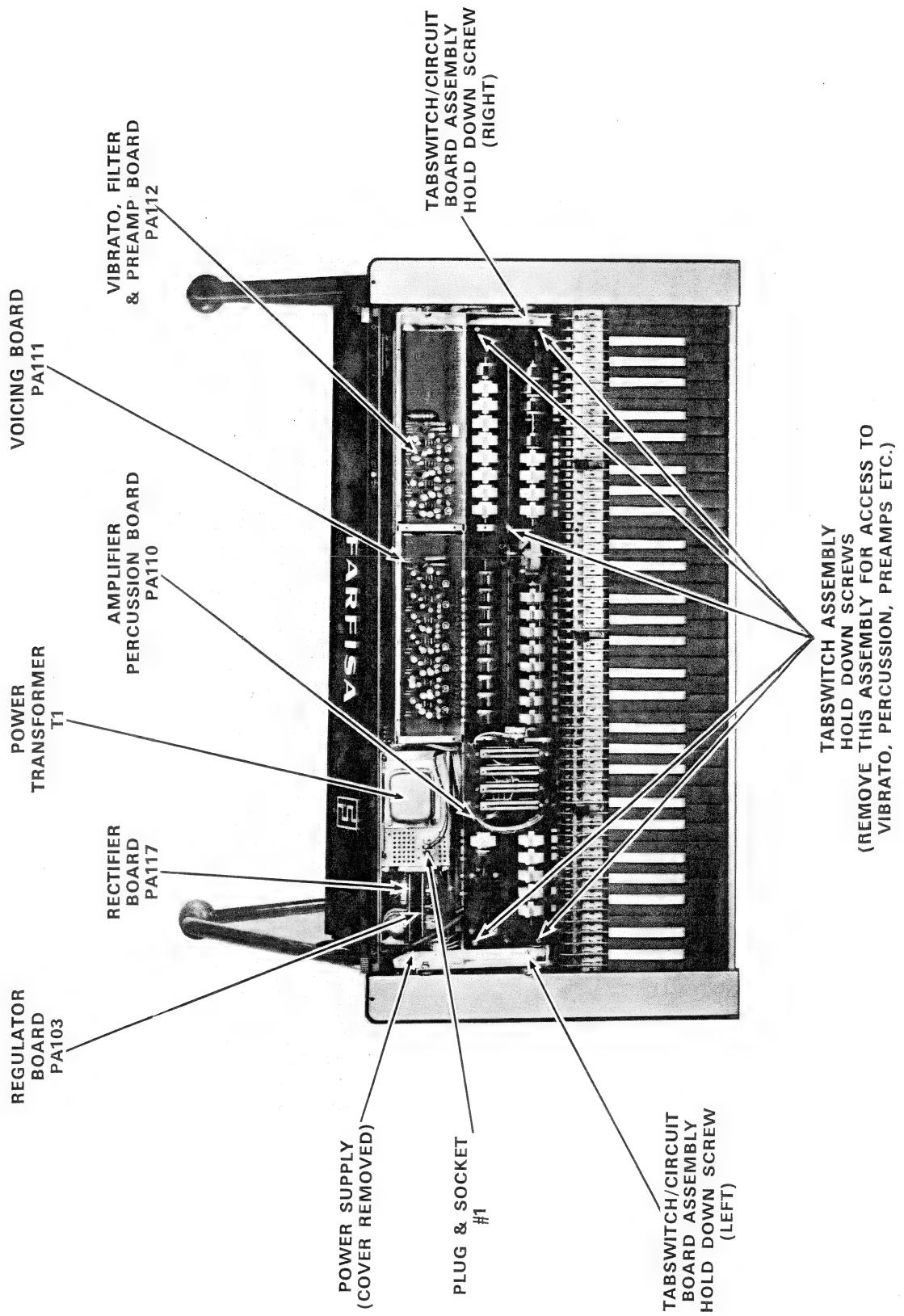


VOLTAGE  
REGULATOR  
TRANSISTOR  
Q49

PRINTED CIRCUIT BOARD BOTTOM  
COVER MOUNTING SCREWS (10)

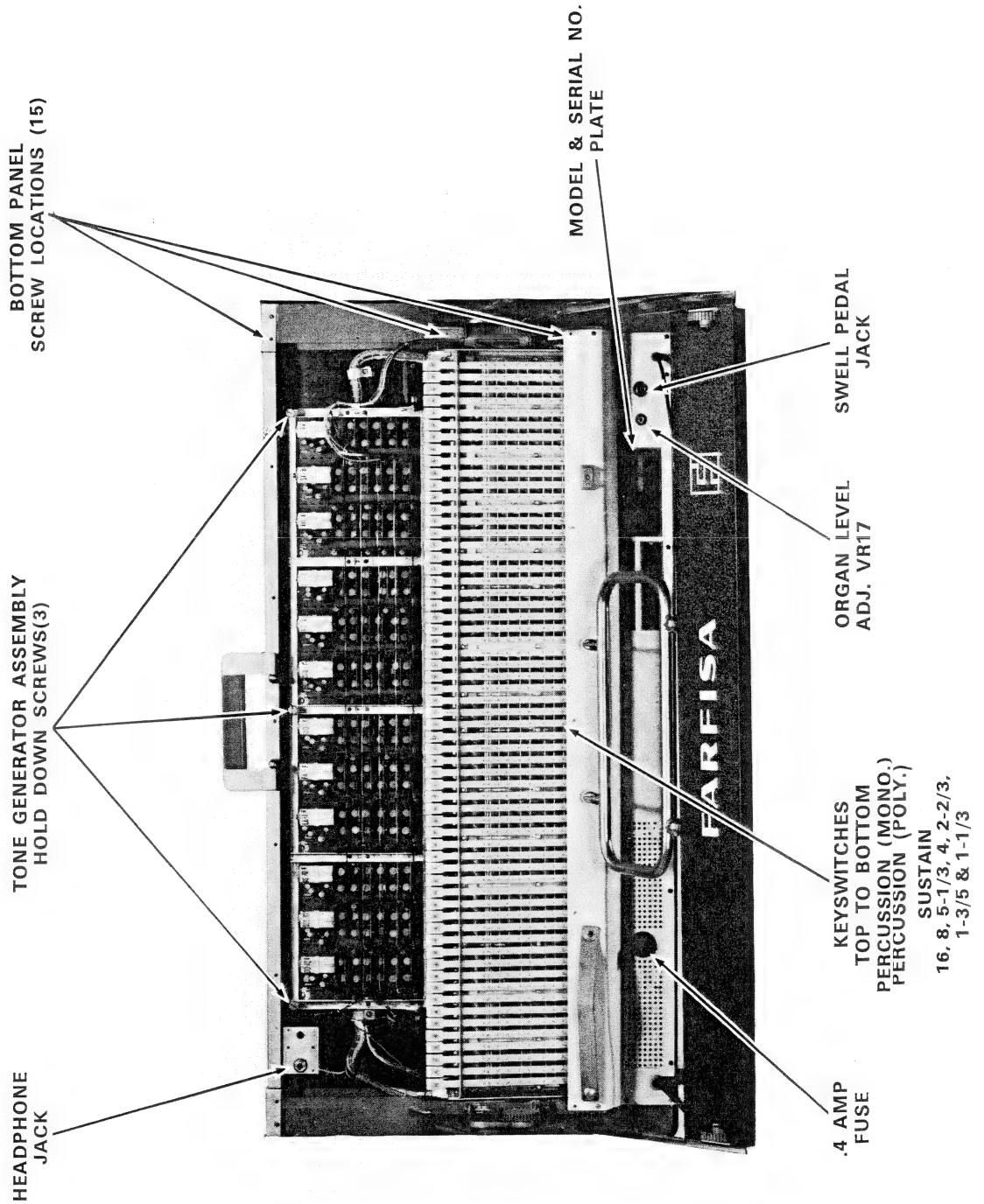
# PROFESSIONAL

## TOP VIEW (With Cover Removed)



# PROFESSIONAL

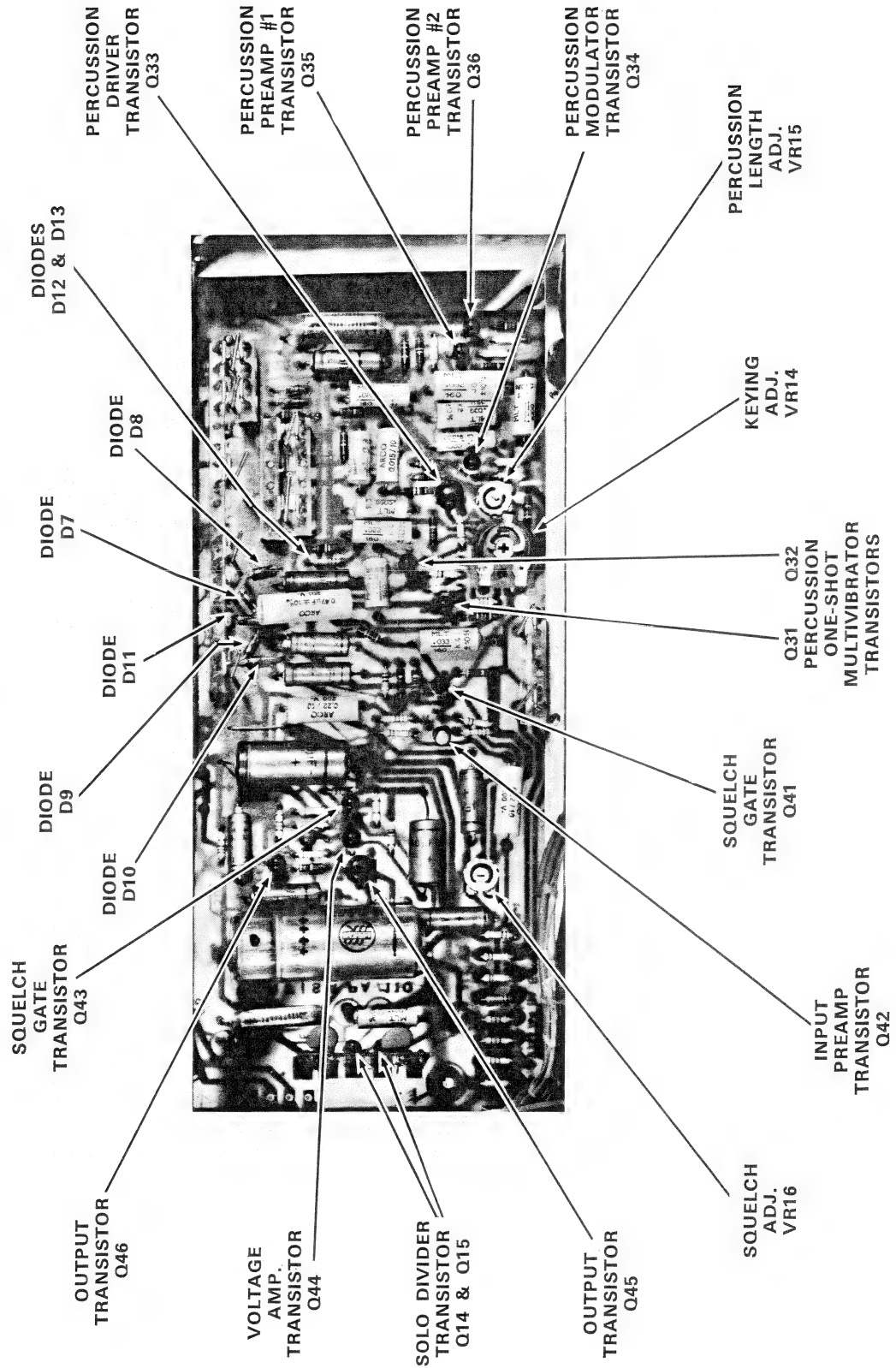
## BOTTOM VIEW PROFESSIONAL





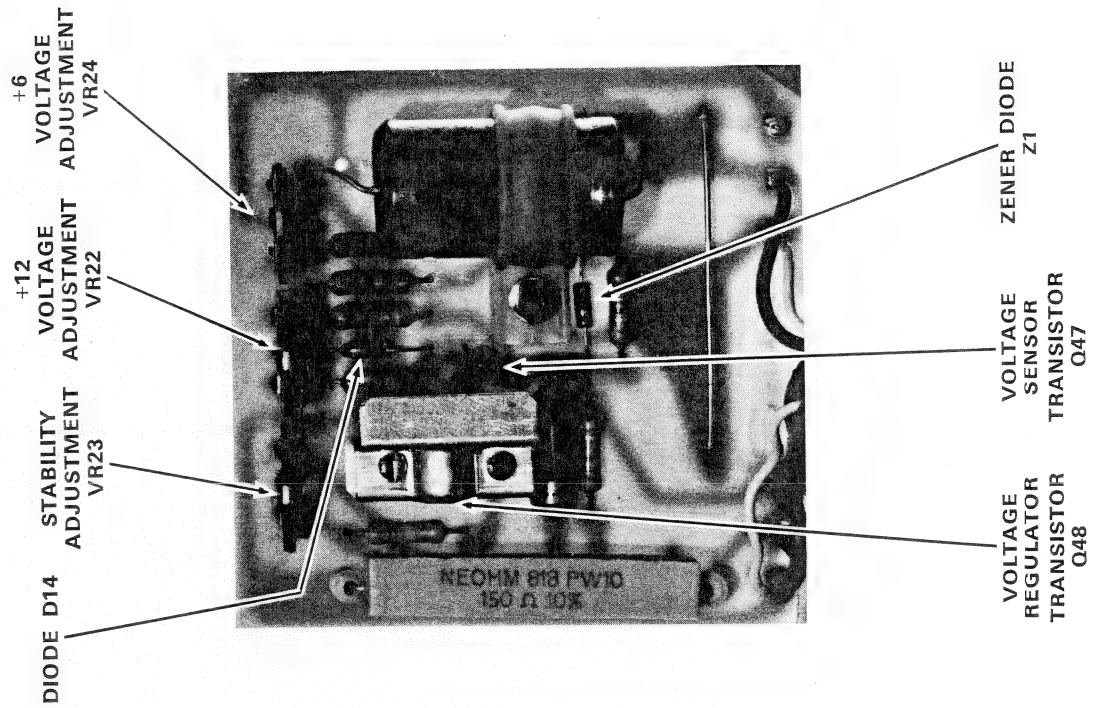
# PROFESSIONAL

## AMPLIFIER & PERCUSSION BOARD PROFESSIONAL (PA-110)

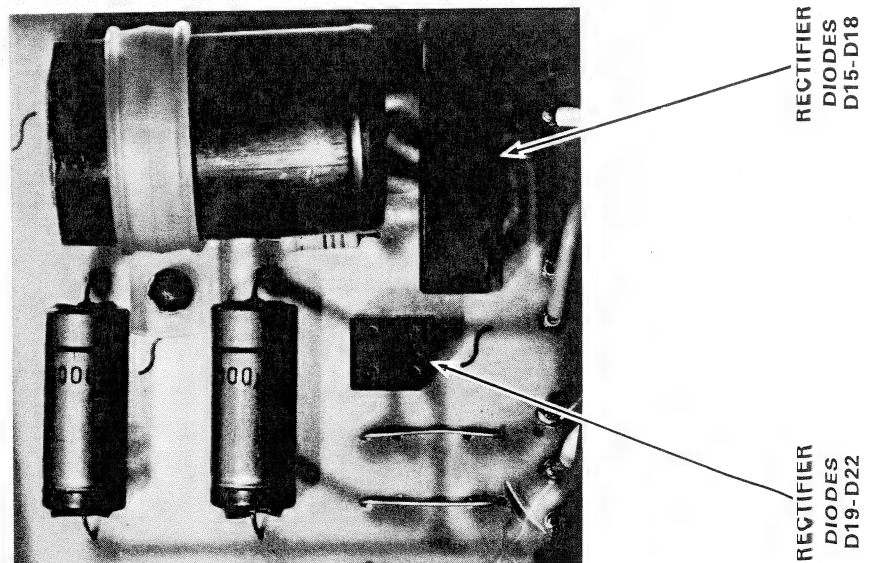


# PROFESSIONAL

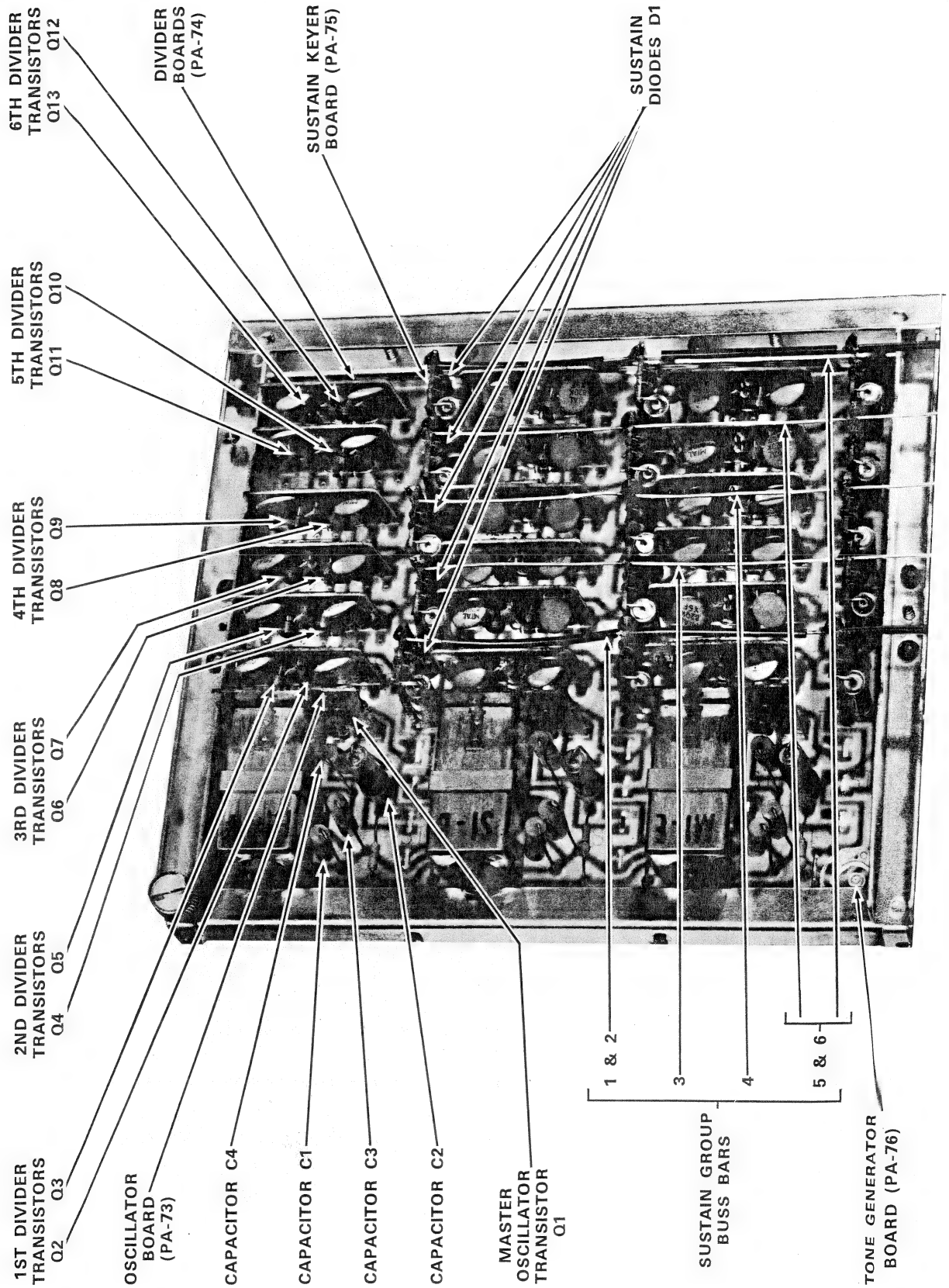
## REGULATOR BOARD PROFESSIONAL (PA-103)



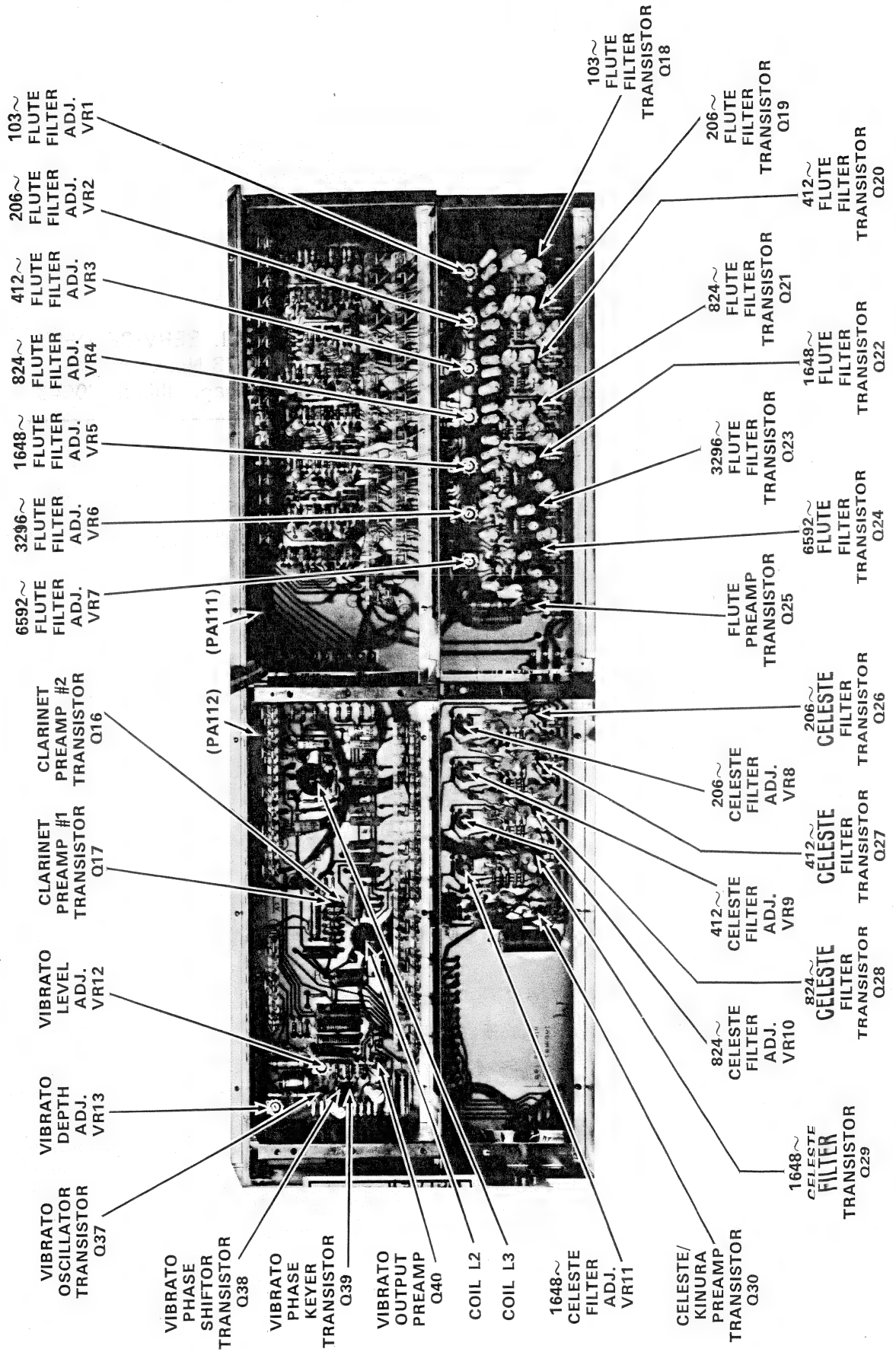
## RECTIFIER BOARD PROFESSIONAL (PA-117)



## **TONE GENERATOR BOARD** (With Oscillator, Divider & Sustain Keyer Boards) **PROFESSIONAL**



## VIBRATO, FILTER & PREAMP BOARD (PA-112) & VOICING BOARD (PA-111) PROFESSIONAL



## PARTS INFORMATION

### STANDARD PARTS

Replacements for all standard electronic parts and hardware may be purchased directly from local suppliers generally in less time than would be required to obtain them from the factory.

### SPECIAL PARTS

In addition to the standard replacement parts, special electronic and mechanical parts are also used. These parts are manufactured by and to the specifications of the factory. Order these parts directly from the factory since they would be difficult or impossible to obtain from other sources.

### PARTS ORDERING INFORMATION

When ordering parts be sure to include the following information:

1. Model and Serial Number
2. Part Number
3. A description of the part
4. Specify how you want the part shipped.

Most special electronic parts and mechanical parts will have a part number stamped on them. In the

event that the part number is missing, or you are unable to read the part number, a complete description of the part and where it is used will allow the factory to fill your parts order. When parts are ordered in the proper manner the factory is able to fill your orders promptly—delays that might result are avoided.

### ADDRESS PARTS ORDERS TO:

C.M.I. SERVICE DEPT.  
7373 No. Cicero Ave.  
Chicago, Illinois 60646

### IMPORTANT

IN ANY CORRESPONDENCE CONCERNING  
THIS INSTRUMENT ALWAYS INCLUDE  
MODEL AND SERIAL NUMBERS

## PARTS LIST

### THE PARTS LIST CONTAINS THE FOLLOWING INFORMATION:

1. Name of Part
2. Value, Tolerance and Code (when important)
3. Brief description
4. Where the part is found (assembly, printed circuit board and etc.)
5. Schematic Reference Number
6. PART NUMBER — USE IT!

This parts list includes all standard stock replacement parts. No attempt has been made to include every nut, bolt and screw. If the necessity for a non-listed part arises, please write describing the part's location and function as well as model and serial number of the unit.



## FAST 2

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>AMPLIFIER BOARD</b>			
Assembly	Amplifier Board Complete (PA58).....	.....	996-011320
Capacitor	Electrolytic 10 UF 65V.....	.....	945-011203-32
Capacitor	Electrolytic 100 UF 35V.....	.....	945-011203-19
Capacitor	Electrolytic 500 UF 45V.....	.....	945-011203-11
Capacitor	Electrolytic 1000 UF 35V.....	.....	945-011203-22
Coil	3 MH .....	L3, 4 .....	956-011321
Diode	1X9179 .....	D2 .....	915-011215
Potentiometer	1K Bias Adj.....	VR5 .....	925-011322
Potentiometer	100K Organ Volume Adj.....	VR4 .....	925-011323
Transistor	Input Preamplifier (1W9640).....	Q16 .....	991-011225
Transistor	Bias Transistor (BC107).....	Q17 .....	991-011313
Transistor	Voltage Amp & Driver #1 (BC142).....	Q18, 19 .....	991-011314
Transistor	Driver #2 (BC143).....	Q20 .....	991-011315
Transistor	Power (T1P14) .....	Q21, 22 .....	992-011317
<b>CONSOLE ASSEMBLY</b>			
Cord	A.C. ....	.....	989-011268
Jack	Expression Pedal .....	.....	910-011263
Jack	Amplifier .....	.....	910-011325
Knob	Bass & Organ Volume (Gray, Silver Cap).....	.....	915-011324
Pilot Light	.....	.....	939-011326
Potentiometer	47K Bass & Organ Volume Controls.....	VR2, 3 .....	925-011310
Speaker	8 Ohm .....	.....	985-011327
Switch	A.C. Off-On .....	.....	960-011267
<b>DIVIDER BOARD</b>			
Assembly	Divider Board (PA74).....	.....	996-011345
Capacitor	Polystyrene 820 MMF.....	.....	946-011205-821
Transistor	Divider (1W9787) .....	Q4-13 .....	991-011318
<b>KEYSWITCH ASSEMBLY</b>			
Key	A Natural White.....	.....	964-01130-1
Key	B Natural White.....	.....	964-01130-2
Key	C Natural White.....	.....	964-01130-3
Key	D Natural White.....	.....	964-01130-4
Key	E Natural White.....	.....	964-01130-5
Key	F Natural White.....	.....	964-01130-6
Key	G Natural White.....	.....	964-01130-7
Key	A Natural Gray.....	.....	964-01131-1
Key	B Natural Gray.....	.....	964-01131-2
Key	C Natural Gray.....	.....	964-01131-3
Key	D Natural Gray.....	.....	964-01131-4
Key	E Natural Gray.....	.....	964-01131-5
Key	F Natural Gray.....	.....	964-01131-6
Key	G Natural Gray.....	.....	964-01131-7
Key	All Sharp—Gray .....	.....	964-01132-1
Key	All Sharp—White .....	.....	964-01132-2
Spring	Key Contact .....	.....	917-01133
Spring	Sharp Key Balance.....	.....	975-01139
Spring	Natural Key Balance.....	.....	975-01138



## FAST 2

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>OSCILLATOR BOARD</b>			
Assembly	F#, B, E Oscillator Board Complete (PA91).....	.....	996-011334-1
Assembly	A, D, G Oscillator Board Complete (PA91)....	.....	996-011334-2
Assembly	C, F, A# Oscillator Board Complete (PA91)...	.....	996-011334-3
Assembly	D#, G#, C# Oscillator Board Complete (PA91)	.....	996-011334-4
Assembly	A Oscillator Board Complete (PA73).....	.....	996-011335-1
Assembly	A# Oscillator Board Complete (PA73).....	.....	996-011335-2
Assembly	B Oscillator Board Complete (PA73).....	.....	996-011335-3
Assembly	C Oscillator Board Complete (PA73).....	.....	996-011335-4
Assembly	C# Oscillator Board Complete (PA73).....	.....	996-011335-5
Assembly	D Oscillator Board Complete (PA73).....	.....	996-011335-6
Assembly	D# Oscillator Board Complete (PA73).....	.....	996-011335-7
Assembly	E Oscillator Board Complete (PA73).....	.....	996-011335-8
Assembly	F Oscillator Board Complete (PA73).....	.....	996-011335-9
Assembly	F# Oscillator Board Complete (PA73).....	.....	996-011335-10
Assembly	G Oscillator Board Complete (PA73).....	.....	996-011335-11
Assembly	G# Oscillator Board Complete (PA73).....	.....	996-011335-12
Coil	Tuning (Blue Dot).....	L1 .....	952-011336
Coil	Tuning (Red Dot).....	L1 .....	952-011337
Diode	1W9179 .....	D1 .....	919-011215
Transistor	Oscillator (1W9810/3) .....	Q3 .....	991-011319
<b>POWER SUPPLY</b>			
Assembly	Power Supply Complete.....	.....	997-011338
Capacitor	Electrolytic 1000 UF 25V.....	.....	945-011203-18
Capacitor	Electrolytic 2000 UF 55V.....	.....	945-011203-36
Diode	Rectifier (BYY31) .....	D3-6 .....	919-011339
Diode	Zener (ZX12) .....	Z1 .....	919-011340
Fuse	.4 Amp .....	.....	939-011341
Holder	Fuse .....	.....	906-006303
Resistor	39 Ohm 20 Watt.....	.....	924-011230-10
Transformer	Power (1046) .....	T1 .....	954-011342
<b>TABSWITCH ASSEMBLY</b>			
Spring	Contact .....	.....	975-011243
Tab	Flute .....	.....	915-011344-1
Tab	Clarinet .....	.....	915-011344-2
Tab	Reed .....	.....	915-011344-3
Tab	Strings .....	.....	915-011344-4
Tab	Vibrato Off-On .....	.....	915-011344-5
Tab	Slow-Fast .....	.....	915-011344-6
<b>VIBRATO &amp; PREAMP BOARD</b>			
Assembly	Vibrato & Preamp Board Complete (PA92)....	.....	996-011323
Capacitor	Electrolytic 25 UF 40V.....	.....	945-011203-7
Capacitor	Electrolytic 100 UF 12V.....	.....	945-011203-10
Capacitor	Electrolytic 200 UF 12V.....	.....	945-011203-16
Capacitor	Electrolytic 200 UF 25V.....	.....	945-011203-20
Coil	2H Filter .....	L2 .....	956-011203
Potentiometer	Vibrato Speed (22K).....	VR1 .....	925-011329
Transistor	Emitter Follower, Preamp #2 (BC113).....	Q2, 15 .....	991-011219
Transistor	Preamp #1 (BC149).....	Q14 .....	991-011315
Transistor	Oscillator (1W9787) .....	Q1 .....	991-011315

## FAST 3

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>CONSOLE ASSEMBLY</b>			
Cord	A.C. Power .....	.....	989-011268
Handle	Cabinet .....	.....	930-013024-1
Knob	Organ Volume (Gray/Silver Cap).....	.....	915-011324
Leg (Left)	Cabinet .....	.....	939-013024-1
Leg (Right)	Cabinet .....	.....	939-013024-2
Light	Pilot .....	.....	939-013025
<b>KEYSWITCH ASSEMBLY</b>			
Actuator	Keyswitch .....	.....	964-013026
Key	C Natural Dark Gray (Bass).....	.....	964-013027-C
Key	D Natural Dark Gray (Bass).....	.....	964-013027-D
Key	E Natural Dark Gray (Bass).....	.....	964-013027-E
Key	F Natural Dark Gray (Bass).....	.....	964-013027-F
Key	G Natural Dark Gray (Bass).....	.....	964-013027-G
Key	A Natural Dark Gray (Bass).....	.....	964-013027-A
Key	B Natural Dark Gray (Bass).....	.....	964-013027-B
Key	C Natural Gray (Treble) .....	.....	964-013028-C
Key	D Natural Gray (Treble) .....	.....	964-013028-D
Key	E Natural Gray (Treble) .....	.....	964-013028-E
Key	F Natural Gray (Treble) .....	.....	964-013028-F
Key	G Natural Gray (Treble) .....	.....	964-013028-G
Key	A Natural Gray (Treble) .....	.....	964-013028-A
Key	B Natural Gray (Treble) .....	.....	964-013028-B
Key	All Sharps (White).....	.....	964-013029
Spring	Key Contact .....	.....	975-013030
Spring	Bass Contact .....	.....	975-013031
Spring	Pull Down Actuator.....	.....	975-013032
Spring	Pull Down Key.....	.....	975-013033
<b>POWER SUPPLY CHASSIS</b>			
Capacitor	Electrolytic 500 UF 15V.....	.....	945-011203-23
Capacitor	Electrolytic 500 UF 50V.....	.....	945-011203-24
Diode	Rectifier .....	D1-4 .....	919-013036
Diode	Zener (5524) .....	Z2 .....	919-013035
Fuse	.2 Amp .....	.....	939-013034
Holder	Fuse .....	.....	906-00603
Resistor	120 Ohm 10W.....	.....	924-013030-5
Transformer	Power (T-1042) .....	T1 .....	954-013037
<b>PREAMP BOARD</b>			
Assembly	Preamp Board (PA-62).....	.....	996-013020
Capacitor	Electrolytic 100 UF 12V.....	.....	945-011203-10
Transistor	Preamp #1, #2 & Output (BC 149).....	Q13-15 .....	991-013016
<b>TABSWITCH ASSEMBLY</b>			
Spring	Tabswitch Contact .....	.....	975-011243
Tab	Manual Bass Selector Treble-Bass.....	.....	915-013044-7
Tab	PF .....	.....	915-013044-8
Tab	Bass 16' .....	.....	915-013044-9

## FAST 3

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
Tab	Clarinet 16' .....	.....	915-011344-10
Tab	Flute 8' .....	.....	915-011344-11
Tab	Oboe 8' .....	.....	915-011344-12
Tab	Trumpet 8' .....	.....	915-011344-13
Tab	Strings 8' .....	.....	915-011344-14
Tab	Flute 4' .....	.....	915-011344-15
Tab	Vibrato Off-On .....	.....	915-011344-5
Tab	Slow-Fast .....	.....	915-011344-6

### tone generator boards

Assembly	A Generator Board Complete (PA-23).....	.....	996-013021-C
Assembly	A# Generator Board Complete (PA-23).....	.....	996-013021-C#
Assembly	B Generator Board Complete (PA-23).....	.....	996-013021-D
Assembly	C Generator Board Complete (PA-23).....	.....	996-013021-D#
Assembly	C# Generator Board Complete (PA-23).....	.....	996-013021-E
Assembly	D Generator Board Complete (PA-23).....	.....	996-013021-F
Assembly	D# Generator Board Complete (PA-23).....	.....	996-013021-F#
Assembly	E Generator Board Complete (PA-23).....	.....	996-013021-G
Assembly	F Generator Board Complete (PA-23).....	.....	996-013021-G#
Assembly	F# Generator Board Complete (PA-23).....	.....	996-013021-A
Assembly	G Generator Board Complete (PA-23).....	.....	996-013021-A#
Assembly	G# Generator Board Complete (PA-23).....	.....	996-013021-B
Capacitor	Electrolytic 25 UF 25V.....	.....	945-011203-25
Coil	Tuning (C—F# Yellow Dot).....	L1 .....	952-011207-1
Coil	Tuning (G—B Green Dot).....	L1 .....	952-011207-2
Transistor	Oscillator (Y 363) .....	Q3 .....	991-011224
Transistor	Divider (SFT 352) .....	Q5-10 .....	991-011222

### Vibrato/Bass Board

Assembly	Vibrato/Bass Board (PA-60).....	.....	996-013018
Capacitor	Electrolytic 1 UF 40V.....	.....	945-011203-1
Capacitor	Electrolytic 5 UF 25V.....	.....	945-011203-2
Capacitor	Electrolytic 50 UF 12V.....	.....	945-011203-8
Capacitor	Electrolytic 100 UF 12V.....	.....	945-011203-10
Potentiometer	Vibrato Speed (10K).....	VR1 .....	925-011232
Transistor	Vibrato Oscillator (SFT 353).....	Q1 .....	991-011223
Transistor	Vibrato Emitter Follower (SFT 367).....	Q2 .....	991-011217
Transistor	Bass Divider (SFT 352).....	Q11, 12 .....	991-011222

### Voicing Board

Assembly	Voicing Board (PA-61).....	.....	996-013019
Capacitor	Electrolytic 1 UF 40V.....	.....	945-011203-1
Capacitor	Electrolytic 100 UF 12V.....	.....	945-011203-10
Coil	Filter (220 MH).....	L2, 3 .....	952-013022
Coil	Filter (450 MH).....	L4, 5 .....	952-013023
Potentiometer	D.C. Balancing (10K).....	VR3 .....	925-011232

## FAST 4 & 5

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>CELEST FILTER BOARD (FAST 5 ONLY)</b>			
Assembly	Celest Filter Board (PA-105).....	.....	996-013043
Potentiometer	22K Celest Filter Adj.....	VR12, 13 .....	925-011329
Transistor	Celest Filter (BC 114).....	Q38, 39 .....	991-013044
<b>CONSOLE ASSEMBLY</b>			
Cord	A.C. Power .....	.....	989-011268
Handle	Cabinet (Fast 4).....	.....	930-013024-2
Handle	Cabinet (Fast 5).....	.....	930-013024-3
Jack	Headphone .....	.....	906-013038
Jack	Swell Pedal .....	.....	906-013039
Knob	Bass Volume (Gray/Silver Cap).....	.....	915-011324
Light	Pilot .....	.....	939-013040
Socket	Bass Pedals .....	.....	906-013041
Switch	Off/On Power .....	.....	960-013042
<b>FLUTE FILTER BOARD</b>			
Assembly	Flute Filter Board (PA-97).....	.....	996-013046
Potentiometer	22K Flute Filter Adj.....	VR7-9 .....	925-011329
Transistor	Filter (BC 114).....	Q24-26 .....	991-013044
<b>KEYSWITCH ASSEMBLY</b>			
Actuator	Keyswitch (White Plastic).....	.....	964-013049
Key	C Natural Black (Bass).....	.....	964-013038-C
Key	D Natural Black (Bass).....	.....	964-013038-D
Key	E Natural Black (Bass).....	.....	964-013038-E
Key	F Natural Black (Bass).....	.....	964-013038-F
Key	G Natural Black (Bass).....	.....	964-013038-G
Key	A Natural Black (Bass).....	.....	964-013038-A
Key	B Natural Black (Bass).....	.....	964-013038-B
Key	C Natural Dark Gray (Bass/Treble) .....	.....	964-013027-C
Key	D Natural Dark Gray (Bass/Treble) .....	.....	964-013027-D
Key	E Natural Dark Gray (Bass/Treble) .....	.....	964-013027-E
Key	F Natural Dark Gray (Bass/Treble) .....	.....	964-013027-F
Key	G Natural Dark Gray (Bass/Treble) .....	.....	964-013027-G
Key	A Natural Dark Gray (Bass/Treble) .....	.....	964-013027-A
Key	B Natural Dark Gray (Bass/Treble) .....	.....	964-013027-B
Key	C Natural Gray (Treble) .....	.....	964-013028-C
Key	D Natural Gray (Treble) .....	.....	964-013028-D
Key	E Natural Gray (Treble) .....	.....	964-013028-E
Key	F Natural Gray (Treble) .....	.....	964-013028-F
Key	G Natural Gray (Treble) .....	.....	964-013028-G
Key	A Natural Gray (Treble) .....	.....	964-013028-A
Key	B Natural Gray (Treble) .....	.....	964-013028-B
Key	All Sharps (White).....	.....	964-013029
Spring	Actuator Pull Down.....	.....	975-013050
Spring	Key Contact .....	.....	975-013051

## FAST 4 & 5

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>MUTE BOARD (FAST 5 ONLY)</b>			
Assembly	Muter Board (PA-113).....	.....	996-013052
Capacitor	Electrolytic 10 UF 12V.....	.....	996-011203-29
Capacitor	Electrolytic 1000 UF 15V.....	.....	945-011203-30
Capacitor	Electrolytic 2000 UF 20V.....	.....	945-011203-31
Diode	Keying (X981) .....	.....	919-013053
Transistor	Preamps, #1, #2, Driver & Muter (BC 113)...	Q43-46 .....	991-011219
<b>OBOE &amp; TRUMPET FILTER BOARD</b>			
Assembly	Oboe & Trumpet Filter Board (PA-99).....	.....	996-013048
Capacitor	Electrolytic 1 UF 250V.....	.....	945-011203-28
Capacitor	Electrolytic 50 UF 12V.....	.....	945-011203-8
Capacitor	Electrolytic 100 UF 12V.....	.....	945-011203-10
Transistor	Filter & Output (BC 114).....	Q28, 29, 37.....	991-013044
<b>PERCUSSION BOARD</b>			
Assembly	Percussion Board (PA-100).....	.....	996-013054
Capacitor	Electrolytic 5 UF 12V.....	.....	945-011203-27
Capacitor	Electrolytic 100 UF 15V.....	.....	945-011203-33
Capacitor	Electrolytic 1000 UF 25V.....	.....	945-011203-18
Potentiometer	10K Percussion Length Adj.....	VR10 .....	925-011231
Potentiometer	1K Percussion Attack Adj.....	VR11 .....	925-011232
Transistor	Multi & Pulse Detector (1W9787).....	Q31-33 .....	991-011318
Transistor	Driver (1W9810/1) .....	Q34 .....	991-011319
Transistor	Keyer (PAC 26).....	Q35 .....	991-013055
Transistor	Percussion Preamp (BC 114).....	Q36 .....	991-013044
<b>POWER SUPPLY</b>			
Assembly	Rectifier Board (PA-102).....	.....	996-013056
Assembly	Regulator Board (PA-103).....	.....	996-013057
Capacitor	Electrolytic 5 UF 35V.....	.....	945-011203-34
Capacitor	Electrolytic 2000 UF 15V.....	.....	945-011203-35
Capacitor	Electrolytic 2000 UF 45V.....	.....	945-011203-13
Diode	Keying .....	D7 .....	919-011215
Diode	Zener (ZF5, 6).....	Z1 .....	919-013058
Diode	Rectifier (Semikron B40 C2200/3500).....	D3-6 .....	919-013061
Fuse	4/10 Amp. ....	.....	939-013065
Holder	Fuse .....	.....	906-006303
Potentiometer	470 Ohm Voltage Adj.....	VR2 .....	925-013059
Potentiometer	47K Stability Adj.....	VR3 .....	925-013060
Resistor	150 Ohm 10W (Neoohm 737).....	.....	924-013062
Transistor	Voltage Sensor (1W9640).....	Q14 .....	991-011225
Transistor	Voltage Regulator (BC 113).....	Q15 .....	991-011219
Transistor	Voltage Regulator (RCA 2N5036).....	Q16 .....	991-013063
Transformer	Power (T-1045) .....	T1 .....	954-013064
<b>PREAMP &amp; FILTER BOARD</b>			
Assembly	Preamp & Filter Board (PA-98).....	.....	996-013047
Capacitor	Electrolytic 5 UF 12V.....	.....	945-011203-27
Potentiometer	22K Flute Filter Adj.....	VR5, 6 .....	925-011329
Transistor	Filter (BC 114).....	Q22, 23, 27, 30.....	991-013044



## FAST 4 & 5

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>SUSTAIN PREAMP BOARD (FAST 5 ONLY)</b>			
Assembly	Sustain Preamp Board (PA-114-1).....	.....	996-013066
Capacitor	Electrolytic 5 UF 12V.....	.....	945-011203-27
Coil	300 MH .....	.....	952-013067
Transistor	Sustain Voicing Preamp (BC 114).....	Q40-42 .....	991-013044

### TABSWITCH ASSEMBLY

Actuator	Tabswitch (Black Plastic).....	.....	964-013068
Spring	Contact .....	.....	975-011243
Tab	Pedal Bass Manual Soft-Sharp.....	.....	915-011344-16
Tab	Manual Bass Selector Treble-Bass.....	.....	915-011344-7
Tab	Slow Fast .....	.....	915-011344-6
Tab	Light Heavy .....	.....	915-011344-17
Tab	Vibrato Off-On .....	.....	915-011344-5
Tab	Bass 16' .....	.....	915-011344-9
Tab	Bass Clarinet 16'.....	.....	915-011344-18
Tab	Flute 8' .....	.....	915-011344-11
Tab	Oboe 8' .....	.....	915-011344-12
Tab	Trumpet 8' .....	.....	915-011344-13
Tab	Strings 8' .....	.....	915-011344-14
Tab	Flute 4' .....	.....	915-011344-15
Tab	Piccolo 4' .....	.....	915-011344-19
Tab	Mixture .....	.....	915-011344-20
Tab	Brilliance Mixture .....	.....	915-011344-21
Tab	Long Short .....	.....	915-011344-22
Tab	Manual Bass Off-On.....	.....	915-011344-23
Tab	Treble Off-On .....	.....	915-011344-24
Tab	Mixture Off-On .....	.....	915-011344-25
Tab	Mixture Soft Sharp.....	.....	915-011344-26
Tab	Celest 8' .....	.....	915-011344-27
Tab	Clavicord 8' .....	.....	915-011344-28
Tab	Kinura 8' .....	.....	915-011344-29
Potentiometer	Bass Volume (22K).....	VR4 .....	925-011329

### TONE GENERATOR ASSEMBLY

Assembly	Oscillator Board (PA-73) .....	.....	996-013069
Assembly	Divider Board (PA-74) .....	.....	996-013070
Assembly	Sustain Board (PA-75) Fast 5 Only.....	.....	996-013071
Capacitor	Electrolytic 50 UF 25V .....	.....	945-011203-39
Coil	Tuning (C# - F#) T-4017 .....	.....	952-011207-1
Coil	Tuning (G - C) T-4018 .....	.....	952-011207-2
Diode	Vibrato & Sustain (1X9809) .....	.....	919-013072
Transistor	Oscillator (1W9810/3) .....	.....	991-011319
Transistor	Divider (1W9787) .....	.....	991-011312

### VIBRATO & SOLO DIVIDER BOARD

Assembly	Vibrato & Solo Divider Board (PA-96) .....	.....	996-013073
	Fast 4 Only .....	.....	
Assembly	Vibrato & Solo Divider Board (PA-96-1) .....	.....	996-013074
	Fast 5 Only .....	.....	
Assembly	Divider Board (PA-74) .....	.....	996-013070
Capacitor	50 UF 6V .....	.....	945-011203-37
Capacitor	200 UF 6V .....	.....	945-011203-38



## FAST 4 & 5

PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
Potentiometer	Vibrato Speed Adj (22K) .....	VR1 .....	925-011329
Transistor	Vib. Osc., 16' & Pedal Solo Divider (1W9787) .....	Q12, 17-20 .....	991-011318
Transistor	Vibrato Emitter Follower (BC 113) .....	Q13 .....	991-011219
Transistor	Bass Preamp (BC 114) .....	Q21 .....	991-013044
Transistor	Driver (1W9787) Fast 5 Only .....	Q42 .....	991-011318

### VOLTAGE FILTER BOARD (FAST 4 ONLY)

Assembly	D. C. Voltage Filter Board (PA-101) .....	.....	996-013045
Capacitor	Electrolytic 1000 UF 25V .....	.....	945-011203-18
Capacitor	Electrolytic 2000 UF 15V .....	.....	945-011203-26

## PROFESSIONAL

### AMPLIFIER & PERCUSSION BOARD

Assembly	Amplifier & Percussion Board (PA-110).....	.....	996-013069
Diode	Keying (1818) .....	D9, 10 .....	919-013059
Diode	Keying (1728) .....	D12, 13 .....	919-013060
Diode	Keying (9803) .....	D7, 8, 11.....	919-013082
Capacitor	Electrolytic 10 UF 12V .....	.....	945-011203-29
Capacitor	Electrolytic 25 UF 12V .....	.....	945-011203-39
Capacitor	Electrolytic 25 UF 25V .....	.....	945-011203-25
Capacitor	Electrolytic 50 UF 25V .....	.....	945-011203-9
Capacitor	Electrolytic 100 UF 12V .....	.....	945-011203-10
Capacitor	Electrolytic 500 UF 6V .....	.....	945-011203-40
Capacitor	Electrolytic 1000 UF 12V .....	.....	945-011203-21
Capacitor	Electrolytic 2000 UF 15V .....	.....	945-011203-26
Potentiometer	500 Ohm Percussion Pulse Adj .....	VR14 .....	925-013083
Potentiometer	10K Percussion Length Adj .....	VR15 .....	925-011232
Potentiometer	470 Ohm Squelch Adj .....	VR16 .....	925-013059
Transistor	16' Solo Divider (1W1632) .....	Q14, 15 .....	991-013056
Transistor	Percussion Multi, Preamp & Driver (1W9787)..	Q31, 32, 36, 44.....	991-011318
Transistor	Percussion Driver & Output (1W9810) .....	Q33, 45 .....	991-011319
Transistor	Percussion Modulator & Squelch Keyer (E103)	Q34, 41 .....	991-013055
Transistor	Percussion Preamp & Output (BC114) .....	Q35, 46 .....	991-013044
Transistor	Amplifier Input Preamp (BC109B) .....	Q42 .....	991-013057
Transistor	Squelch Gate (1W9640) .....	Q43 .....	991-013058

### CONSOLE ASSEMBLY

Cord	Output (with plug) .....	.....	989-013092
Cord	A. C. Power .....	.....	989-011268
Cover	Organ Top .....	.....	930-013089
Fuse	4/10 Amp (Slo-Blo) .....	.....	939-013065
Handle	Cabinet .....	.....	930-013024-4
Holder	Fuse .....	.....	906-006303
Jack	Headphone .....	.....	906-013038
Jack	Swell Pedal .....	.....	906-013039
Light	Pilot .....	.....	939-013062
Potentiometer	Level Adjustment .....	VR17 .....	925-013063
Switch	Off/On Power .....	.....	960-013064

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PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>KEYSWITCH ASSEMBLY</b>			
Actuator	Keyswitch (White Plastic).....	.....	964-013065
Contact	Spring .....	.....	975-013051
Key	C Natural Gray with metal channel.....	.....	964-013065-C
Key	C# Natural Gray with metal channel.....	.....	964-013065-C#
Key	D Natural Gray with metal channel.....	.....	964-013065-D
Key	D# Natural Gray with metal channel.....	.....	964-013065-D#
Key	E Natural Gray with metal channel.....	.....	964-013065-E
Key	F Natural Gray with metal channel.....	.....	964-013065-F
Key	F# Natural Gray with metal channel.....	.....	964-013065-F#
Key	G Natural Gray with metal channel.....	.....	964-013065-G
Key	G# Natural Gray with metal channel.....	.....	964-013065-G#
Key	A Natural Gray with metal channel.....	.....	964-013065-A
Key	A# Natural Gray with metal channel.....	.....	964-013065-A#
Key	B Natural Gray with metal channel.....	.....	964-013065-B
Key	All Sharps (White) with metal channel.....	.....	964-013066
Spring	Pull Down .....	.....	975-013050

## POWER SUPPLY CHASSIS

Assembly	Rectifier Board (PA-117).....	.....	996-013078
Capacitor	Regulator Board (PA-103).....	.....	996-013057
Capacitor	Electrolytic 5 UF 40V.....	.....	945-011203-41
Capacitor	Electrolytic 1000 UF 12V.....	.....	945-011203-21
Capacitor	Electrolytic 2000 UF 30V.....	.....	945-011203-42
Capacitor	Electrolytic 2000 UF 12V.....	.....	954-011203-26
Diode	Keying .....	D14 .....	919-013081
Diode	Rectifier (Semikron B40C3200/2200).....	D15-18 .....	919-013079
Diode	Zener .....	Z1 .....	919-013083
Fuse	4/10 Amp .....	.....	939-013065
Holder	Fuse .....	.....	906-006003
Potentiometer	470 Ohm Voltage Adj.....	VR22, 24 .....	925-013059
Potentiometer	47K Stability Adj.....	VR23 .....	925-013060
Resistor	150 Ohm 10W (Neohm 737).....	.....	924-013062
Transistor	Voltage Sensor (1W9640).....	Q47 .....	991-011225
Transistor	Voltage Regulator (BC114).....	Q48 .....	991-011219
Transistor	Voltage Regulator (RCA 2N5036).....	Q49 .....	991-013063
Transformer	Power (T-1048) .....	T1 .....	954-013081

## TABSWITCH ASSEMBLY

Actuator	Tabswitch (White Plastic).....	.....	964-013073
Contact	Spring .....	.....	917-013074
Knob	Volume Slider (Dark Green) .....	.....	925-013061-1
Knob	Volume Slider (Light Green) .....	.....	925-013061-2
Knob	Volume Slider (Orange) .....	.....	925-013061-3
Knob	Volume Slider (Yellow) .....	VR18-21 .....	925-013061-4
Potentiometer	Slide-Volume Balance .....	.....	925-013077
Tab	Blue .....	.....	915-013075-1
Tab	Green .....	.....	915-013075-2
Tab	Light Green .....	.....	915-013075-3
Tab	Yellow .....	.....	915-013075-4
Tab	Orange .....	.....	915-013075-5
Tab	Percussion Duration (3 Position).....	.....	915-013076
Switch	Percussion Duration (3 Position).....	.....	960-013090
Switch	Percussion Squelch .....	.....	960-013091

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PART	DESCRIPTION	SCHEMATIC REFERENCE	PART NUMBER
<b>STONE GENERATOR BOARD</b>			
Assembly	Oscillator Board (PA-73).....	.....	997-013086
Assembly	Divider Board (PA-74).....	.....	997-013087
Assembly	Sustain Board (PA-75).....	.....	997-013088
Assembly	Tone Generator Board (PA-76) [3 Notes].....	.....	996-013070
Capacitor	1 UF 40V.....	.....	945-011203-1
Capacitor	50 UF 25V.....	.....	945-011203-9
Coil	Tuning (F#-B) T-4023.....	L1.....	952-013085-1
Coil	Tuning (C-F) T-4024.....	L1.....	952-013085-2
Diode	Keying (1809).....	D1.....	919-013067
Transistor	Master Oscillator (1W9810).....	Q1.....	991-011319
Transistor	Divider (1W9787).....	Q2-13.....	991-011318
<b>VIBRATO, FILTER &amp; PREAMP BOARD</b>			
Assembly	Vibrato, Filter & Preamp Board (PA-112).....	.....	996-013035
Capacitor	Electrolytic 50 UF 6V.....	.....	945-011203-37
Capacitor	Electrolytic 50 UF 25V.....	.....	945-011203-9
Capacitor	Electrolytic 200 UF 6V.....	.....	945-011203-38
Capacitor	Electrolytic 500 UF 6V.....	.....	945-011203-40
Coil	220 MH (18/11-3H1).....	L2, 3.....	952-013022
Potentiometer	20K Vibrato Level.....	VR12.....	925-013084
Potentiometer	50K Vibrato Depth.....	VR13.....	925-011233
Transistor	Clarinet/Sharp Preamp & Vibrato Osc. (1W9787)	Q16, 17, 37.....	991-011318
Transistor	Vibrato Phase Shifter & Output Preamp (BC114)	Q38, 40.....	991-013044
Transistor	Vibrato Phase Keyer (E103).....	Q39.....	991-013055
<b>VOICING BOARD</b>			
Assembly	Voicing Board (PA-111).....	.....	996-013071
Capacitor	1 UF 12V.....	.....	945-011203-1
Capacitor	5 UF 12V.....	.....	945-011203-27
Capacitor	1000 UF 12V.....	.....	945-011203-21
Potentiometer	22K Filter Adj.....	VR1-11.....	925-011329
Transistor	Flute & Celeste Filters & Flute Preamp (BC114)	Q18-29.....	991-013044
Transistor	Celeste/Kinura Preamp.....	Q30.....	991-013068